



Report Information

Name: Leslie Knope**Date of Report:** October 27, 2026**Data Source:** 23andMe**Report Version:** v4.5

About This Report

This report contains pharmacogenetic alleles and implications for drug response for the genetic data submitted. Both the genotypes presented and implicated medications are predictions based on the submitted data and published pharmacogenetics literature. This is not a clinical report and the data contained here in no way should be used as clinical guidance.

The information presented in this report is based on allele mappings and therapeutic implications developed by the [Clinical Pharmacogenomics Implementation Consortium \(CPIC®\)](#) and the [US Food and Drug administration \(FDA\)](#). Gene2Rx is not affiliated with CPIC or the FDA in any way. The contents of this page have not been endorsed by CPIC or the FDA and are the sole responsibility of Gene2Rx.

This report includes information about how your pharmacogenetics may influence your response to the medications assessed in this report. 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.

The implications of taking medication for which you may have an atypical response are based on probabilities. You may or may not experience any side effects or altered efficaciousness. Consult your healthcare provider before making any changes to your healthcare.

The quality of uploaded data is not verified and may contain errors that result in alterations to your pharmacogenetic report. Genotyping panels (such as those used by direct to consumer genetics services) offer an incomplete representation of an individual's genetics. You may harbor additional genetic variation that can affect drug response.

⚠ Disclaimer: Do not alter your medication dose or stop your medication without first consulting your healthcare provider.

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This table contains the specific variants identified in each of the genes assessed for your Gene2Rx report. Evidence and actionability differ by gene and medication.

A few genes (including CYP2D6, CYP2C9, and DPYD) get a number called an *activity score* instead of a single category. The score is the sum of the activity values of your two gene copies, and a higher number means more enzyme activity. Dosing guidelines for these genes are often based on the score, so we show it next to the phenotype when it applies.

	GENE	GENOTYPE	PHENOTYPE
✓	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	No Result
⬆	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 (Activity Score 1.5)
✗	CYP2D6	*4/*4	Poor Metabolizer (Activity Score 0.0)
✓	CYP3A4	*1/*1	Normal Metabolizer
⬇	CYP3A5	*1/*3	Intermediate Metabolizer
⬇	CYP4F2	*1/*3	Intermediate Metabolizer
✓	DPYD	Reference/Reference	Normal Metabolizer (Activity Score 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	No Result
⬇	SLCO1B1	*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

PHENOTYPE SYMBOLS

Each symbol represents the predicted function of the gene. A non-normal allele does not necessarily lead to a change in drug response.

- ✓ Normal function
- ⬇ Decreased function
- ⬆ Increased function
- ✗ Severely decreased function or high-risk finding
- ⊖ Unknown function

Drugs are grouped by clinical class. For each class with three or more drugs in your report, a scoreboard summarizes which medications you are likely to use as directed, which warrant caution, and which you may want to discuss alternatives for. The detailed tables below each scoreboard show the underlying gene-drug findings.

Therapeutic Guidance Legend

- Use as directed
- Use with caution / dose adjustment
- Consider alternative

Antidepressants

14 drugs

USE AS DIRECTED 0

No drugs in this category.

USE WITH CAUTION 6

Citalopram
CYP2C19Escitalopram
CYP2C19Fluvoxamine
CYP2D6Paroxetine
CYP2D6Sertraline
CYP2B6, CYP2C19Vortioxetine
CYP2D6

CONSIDER ALTERNATIVE 8

Amitriptyline
CYP2C19, CYP2D6Clomipramine
CYP2C19, CYP2D6Desipramine
CYP2D6Doxepin
CYP2C19, CYP2D6Imipramine
CYP2C19, CYP2D6Nortriptyline
CYP2D6Trimipramine
CYP2C19, CYP2D6Venlafaxine
CYP2D6

Each card shows the gene driving the recommendation. Use as directed = your genetics suggest a typical response. Use with caution = consider dose adjustment or monitoring. Consider alternative = guidelines suggest discussing a different drug with your provider.

Antidepressants - SNRI

GENERIC NAME	BRAND NAMES	GENE	YOUR GENE PHENOTYPE	IMPLICATION	SOURCE
⚠ Venlafaxine	Effexor XR	CYP2D6	● Poor Metabolizer	CPIC: <i>Implication:</i> 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. <i>Therapeutic recommendation:</i> Consider a clinically appropriate alternative antidepressant not predominantly metabolized by CYP2D6. FDA: Alters systemic parent drug and metabolite concentrations. Consider dosage reductions.	CPIC, FDA

Antidepressants - SSRI

GENERIC NAME	BRAND NAMES	GENE	YOUR GENE PHENOTYPE	IMPLICATION	SOURCE
 Citalopram	Celexa	CYP2C19	 Intermediate Metabolizer	CPIC: <i>Implication:</i> Reduced metabolism when compared with CYP2C19 normal metabolizers. Higher plasma concentrations may increase the probability of side effects. <i>Therapeutic recommendation:</i> Initiate therapy with recommended starting dose. Consider a slower titration schedule and lower maintenance dose than normal metabolizers. FDA: No FDA guidance for your genotype	CPIC, FDA
 Escitalopram	Lexapro	CYP2C19	 Intermediate Metabolizer	<i>Implication:</i> Reduced metabolism when compared with CYP2C19 normal metabolizers. Higher plasma concentrations may increase the probability of side effects. <i>Therapeutic recommendation:</i> Initiate therapy with recommended starting dose. Consider a slower titration schedule and lower maintenance dose than normal metabolizers.	CPIC
 Fluvoxamine	Luvox	CYP2D6	 Poor Metabolizer	<i>Implication:</i> Greatly reduced metabolism of fluvoxamine to less active compounds compared with normal metabolizers. Higher plasma concentrations may increase the probability of side effects. <i>Therapeutic recommendation:</i> 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.	CPIC
 Paroxetine	Paxil, Seroxat	CYP2D6	 Poor Metabolizer	<i>Implication:</i> Greatly reduced metabolism compared with CYP2D6 normal metabolizers. Higher plasma concentrations may increase the probability of side effects. <i>Therapeutic recommendation:</i> Consider a 50% reduction in recommended starting dose, slower titration schedule, and a 50% lower maintenance dose as compared with normal metabolizers.	CPIC
 Sertraline	Zoloft	CYP2C19	 Intermediate Metabolizer	<i>Combined implication:</i> CYP2C19: Reduced metabolism of sertraline to less active compounds when compared to CYP2C19 normal metabolizers. CYP2B6: Normal metabolism of sertraline to less active compounds. <i>Recommendation:</i> Initiate therapy with recommended starting dose. Consider a slower titration schedule and lower maintenance dose. Evidence strength: Moderate From the combined CYP2C19 and CYP2B6 table in CPIC's guideline for serotonin reuptake inhibitor antidepressants.	CPIC
		CYP2B6	 Normal Metabolizer		
 Vortioxetine	Trintellix, Brintellix	CYP2D6	 Poor Metabolizer	CPIC: <i>Implication:</i> Greatly reduced metabolism of vortioxetine to inactive compounds compared with normal metabolizers. Higher plasma concentrations may increase the probability of side effects. <i>Therapeutic recommendation:</i> 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. FDA: Results in higher systemic concentrations. The maximum recommended dose is 10 mg.	CPIC, FDA

Antidepressants - TCA

GENERIC NAME	BRAND NAMES	GENE	YOUR GENE PHENOTYPE	IMPLICATION	SOURCE
 Amitriptyline	Elavil	CYP2D6	 Poor Metabolizer (Activity Score 0.0)	<i>Combined implication:</i> 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 <i>Recommendation:</i> 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. Evidence strength: Optional From the combined CYP2D6 and CYP2C19 table in CPIC's guideline for tricyclic antidepressants. CYP2D6 is matched on its activity score.	CPIC
		CYP2C19	 Intermediate Metabolizer		

GENERIC NAME	BRAND NAMES	GENE	YOUR GENE PHENOTYPE	IMPLICATION	SOURCE
⚠	Clomipramine	Anafranil	✖ Poor Metabolizer (Activity Score 0.0)	<p>Combined implication: 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</p> <p>CYP2C19: Reduced metabolism of tertiary amines compared to normal metabolizers</p> <p>Recommendation: 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.</p> <p>Evidence strength: Optional</p> <p>From the combined CYP2D6 and CYP2C19 table in CPIC's guideline for tricyclic antidepressants. CYP2D6 is matched on its activity score.</p>	CPIC
			🟡 Intermediate Metabolizer		
⚠	Desipramine	Norpramin	✖ Poor Metabolizer	<p>Implication: 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. Therapeutic recommendation: 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.</p>	CPIC
⚠	Doxepin	Sinequan, Quitaxon, Aponal	✖ Poor Metabolizer (Activity Score 0.0)	<p>Combined implication: 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</p> <p>CYP2C19: Reduced metabolism of tertiary amines compared to normal metabolizers</p> <p>Recommendation: 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.</p> <p>Evidence strength: Optional</p> <p>From the combined CYP2D6 and CYP2C19 table in CPIC's guideline for tricyclic antidepressants. CYP2D6 is matched on its activity score.</p>	CPIC
			🟡 Intermediate Metabolizer		
⚠	Imipramine	Tofranil	✖ Poor Metabolizer (Activity Score 0.0)	<p>Combined implication: 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</p> <p>CYP2C19: Reduced metabolism of tertiary amines compared to normal metabolizers</p> <p>Recommendation: 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.</p> <p>Evidence strength: Optional</p> <p>From the combined CYP2D6 and CYP2C19 table in CPIC's guideline for tricyclic antidepressants. CYP2D6 is matched on its activity score.</p>	CPIC
			🟡 Intermediate Metabolizer		
⚠	Nortriptyline	Pamelor	✖ Poor Metabolizer	<p>Implication: 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. Therapeutic recommendation: 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.</p>	CPIC
⚠	Trimipramine	Surmontil	✖ Poor Metabolizer (Activity Score 0.0)	<p>Combined implication: 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</p> <p>CYP2C19: Reduced metabolism of tertiary amines compared to normal metabolizers</p> <p>Recommendation: 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.</p> <p>Evidence strength: Optional</p> <p>From the combined CYP2D6 and CYP2C19 table in CPIC's guideline for tricyclic antidepressants. CYP2D6 is matched on its activity score.</p>	CPIC
			🟡 Intermediate Metabolizer		

Antipsychotics

12 drugs

USE AS DIRECTED 1

Quetiapine
CYP3A4

USE WITH CAUTION 10

Aripiprazole
CYP2D6

Aripiprazole Lauroxil
CYP2D6

Brexpiprazole
CYP2D6

Clozapine
CYP2D6

Haloperidol
CYP2D6

Iloperidone
CYP2D6

Perphenazine
CYP2D6

Pimozide
CYP2D6

Risperidone
CYP2D6

Zuclopenthixol
CYP2D6

CONSIDER ALTERNATIVE 1

Thioridazine
CYP2D6

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GENERIC NAME	BRAND NAMES	GENE	YOUR GENE PHENOTYPE	IMPLICATION	SOURCE
⚠️ Aripiprazole Lauroxil	Aristada	CYP2D6	❌ Poor Metabolizer	Results in higher systemic concentrations. Dosage adjustment is recommended. Refer to FDA labeling for specific dosing recommendations.	FDA
⚠️ Aripiprazole	Ablify	CYP2D6	❌ Poor Metabolizer	DPWG: Decreased CYP2D6 activity raises the combined blood level of aripiprazole and its active metabolite, increasing the risk of side effects. FDA: Results in higher systemic concentrations and higher adverse reaction risk. Dosage adjustment is recommended. Refer to FDA labeling for specific dosing recommendations.	DPWG, FDA
⚠️ Brexpiprazole	Rexulti	CYP2D6	❌ Poor Metabolizer	DPWG: Decreased CYP2D6 activity reduces the metabolism of brexpiprazole, so the risk of side effects is theoretically increased. FDA: Results in higher systemic concentrations. Dosage adjustment is recommended. Refer to FDA labeling for specific dosing recommendations.	DPWG, FDA
⚠️ Clozapine	Clozaril	CYP2D6	❌ Poor Metabolizer	DPWG: CYP2D6 variation can change clozapine blood levels, but this has no clinical consequences. FDA: Results in higher systemic concentrations. Dosage reductions may be necessary.	DPWG, FDA
⚠️ Haloperidol	Haldol	CYP2D6	❌ Poor Metabolizer	Decreased CYP2D6 activity reduces conversion of haloperidol, increasing plasma concentration approximately 1.7-fold. This is associated with an increased risk of side effects.	DPWG
⚠️ Iloperidone	Fanapt	CYP2D6	❌ Poor Metabolizer	Results in higher systemic concentrations and higher adverse reaction risk (QT prolongation). Reduce dosage by 50%.	FDA
⚠️ Perphenazine	Trilafon	CYP2D6	❌ Poor Metabolizer	Results in higher systemic concentrations and higher adverse reaction risk.	FDA
⚠️ Pimozide	Orap	CYP2D6	❌ Poor Metabolizer	DPWG: 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. FDA: 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.	DPWG, FDA
✅ Quetiapine	Seroquel	CYP3A4	✅ Normal Metabolizer	No clinically significant effect on quetiapine metabolism.	DPWG
⚠️ Risperidone	Risperdal	CYP2D6	❌ Poor Metabolizer	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%.	DPWG
⚠️ Thioridazine	Mellaril	CYP2D6	❌ Poor Metabolizer	Results in higher systemic concentrations and higher adverse reaction risk (QT prolongation). Predicted effect based on experience with CYP2D6 inhibitors. Contraindicated in poor metabolizers.	FDA
⚠️ Zuclopenthixol	Clopixol	CYP2D6	❌ Poor Metabolizer	Markedly decreased CYP2D6 activity reduces conversion of zuclopenthixol, raising plasma concentration approximately 1.6-fold and elevating side effect risk.	DPWG

Psychostimulants

2 drugs

GENERIC NAME	BRAND NAMES	GENE	YOUR GENE PHENOTYPE	IMPLICATION	SOURCE
 Amphetamine	Adzenys ER	CYP2D6	 Poor Metabolizer	May affect systemic concentrations and adverse reaction risk. Consider lower starting dosage or use alternative agent.	FDA
 Atomoxetine	Strattera	CYP2D6	 Poor Metabolizer (Activity Score 0.0)	<p>CPIC: <i>Implication:</i> 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. <i>Therapeutic recommendation:</i> 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.</p> <p>FDA: 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.</p>	CPIC , FDA

Movement disorders

3 drugs

USE AS DIRECTED 0 <p>No drugs in this category.</p>	USE WITH CAUTION 3 <div>Deutetrabenazine CYP2D6</div> <div>Tetrabenazine CYP2D6</div> <div>Valbenazine CYP2D6</div>	CONSIDER ALTERNATIVE 0 <p>No drugs in this category.</p>
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Each card shows the gene driving the recommendation. Use as directed = your genetics suggest a typical response. Use with caution = consider dose adjustment or monitoring. Consider alternative = guidelines suggest discussing a different drug with your provider.

GENERIC NAME	BRAND NAMES	GENE	YOUR GENE PHENOTYPE	IMPLICATION	SOURCE
 Deutetrabenazine	Austedo	CYP2D6	 Poor Metabolizer	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).	FDA
 Tetrabenazine	Xenazine	CYP2D6	 Poor Metabolizer	Results in higher systemic concentrations. The maximum recommended single dose is 25 mg and should not exceed 50 mg/day.	FDA
 Valbenazine	Ingrezza	CYP2D6	 Poor Metabolizer	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.	FDA

Anticonvulsants

4 drugs

USE AS DIRECTED 0 <p>No drugs in this category.</p>	USE WITH CAUTION 4 <div>Brivaracetam CYP2C19</div> <div>Clobazam CYP2C19</div> <div>Fosphenytoin CYP2C9</div> <div>Phenytoin CYP2C9</div>	CONSIDER ALTERNATIVE 0 <p>No drugs in this category.</p>
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Each card shows the gene driving the recommendation. Use as directed = your genetics suggest a typical response. Use with caution = consider dose adjustment or monitoring. Consider alternative = guidelines suggest discussing a different drug with your provider.

GENERIC NAME	BRAND NAMES	GENE	YOUR GENE PHENOTYPE	IMPLICATION	SOURCE
⚠️ Brivaracetam	Briviact	CYP2C19	🟡 Intermediate Metabolizer	Results in higher systemic concentrations and higher adverse reaction risk.	FDA
⚠️ Clobazam	Onfi, Frisium	CYP2C19	🟡 Intermediate Metabolizer	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.	FDA
⚠️ Fosphenytoin	Cerebyx	CYP2C9	🟡 Intermediate Metabolizer (Activity Score 1.5)	CPIC: <i>Implication:</i> Slightly reduced fosphenytoin metabolism; however, this does not appear to translate into increased side effects. <i>Therapeutic recommendation:</i> 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. FDA: 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.	CPIC, FDA
⚠️ Phenytoin	Dilantin	CYP2C9	🟡 Intermediate Metabolizer (Activity Score 1.5)	CPIC: <i>Implication:</i> Slightly reduced phenytoin metabolism; however, this does not appear to translate into increased side effects. <i>Therapeutic recommendation:</i> 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. FDA: 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.	CPIC, FDA

Pain management

13 drugs

USE AS DIRECTED 6	USE WITH CAUTION 5	CONSIDER ALTERNATIVE 2
<div>Carisoprodol CYP2C19</div> <div>Celecoxib CYP2C9</div> <div>Flurbiprofen CYP2C9</div> <div>Ibuprofen CYP2C9</div> <div>Lornoxicam CYP2C9</div> <div>Tenoxicam CYP2C9</div>	<div>Hydrocodone CYP2D6</div> <div>Meloxicam CYP2C9</div> <div>Oliceridine CYP2D6</div> <div>Piroxicam CYP2C9</div> <div>Pitolisant CYP2D6</div>	<div>Codeine CYP2D6</div> <div>Tramadol CYP2D6</div>

Each card shows the gene driving the recommendation. Use as directed = your genetics suggest a typical response. Use with caution = consider dose adjustment or monitoring. Consider alternative = guidelines suggest discussing a different drug with your provider.

GENERIC NAME	BRAND NAMES	GENE	YOUR GENE PHENOTYPE	IMPLICATION	SOURCE
✓ Carisoprodol	Soma	CYP2C19	🟡 Intermediate Metabolizer	No FDA guidance for this phenotype	FDA
✓ Celecoxib	Celebrex	CYP2C9	🟡 Intermediate Metabolizer (Activity Score 1.5)	CPIC: <i>Implication:</i> Mildly reduced metabolism <i>Therapeutic recommendation:</i> 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. FDA: No FDA guidance for your genotype	CPIC, FDA
⚠ Codeine	Tylenol 3	CYP2D6	🔴 Poor Metabolizer	CPIC: <i>Implication:</i> Greatly reduced morphine formation leading to diminished analgesia. <i>Therapeutic recommendation:</i> Avoid codeine use because of possibility of diminished analgesia. If opioid use is warranted, consider a non-tramadol opioid. FDA: Results in lower systemic active metabolite concentrations and may result in reduced efficacy.	CPIC, FDA
✓ Flurbiprofen	Ansaid, Ocufen, Strefen	CYP2C9	🟡 Intermediate Metabolizer (Activity Score 1.5)	CPIC: <i>Implication:</i> Mildly reduced metabolism <i>Therapeutic recommendation:</i> 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. FDA: No FDA guidance for your genotype	CPIC, FDA
⚠ Hydrocodone	Hysingla ER	CYP2D6	🔴 Poor Metabolizer	<i>Implication:</i> 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. <i>Therapeutic recommendation:</i> Use hydrocodone label recommended age- or weight-specific dosing. If no response and opioid use is warranted, consider non-codeine and non-tramadol opioid.	CPIC
✓ Ibuprofen	Advil	CYP2C9	🟡 Intermediate Metabolizer (Activity Score 1.5)	<i>Implication:</i> Mildly reduced metabolism <i>Therapeutic recommendation:</i> 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.	CPIC
✓ Lornoxicam	Xefo	CYP2C9	🟡 Intermediate Metabolizer (Activity Score 1.5)	<i>Implication:</i> Mildly reduced metabolism <i>Therapeutic recommendation:</i> 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.	CPIC
⚠ Meloxicam	Mobic	CYP2C9	🟡 Intermediate Metabolizer (Activity Score 1.5)	CPIC: <i>Implication:</i> Mildly reduced metabolism <i>Therapeutic recommendation:</i> 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. FDA: No FDA guidance for this phenotype	CPIC, FDA
⚠ Oliceridine	Olinvyk	CYP2D6	🔴 Poor Metabolizer	Results in higher systemic concentrations and higher adverse reaction risk (respiratory depression and sedation). May require less frequent dosing.	FDA
⚠ Piroxicam	Feldene	CYP2C9	🟡 Intermediate Metabolizer (Activity Score 1.5)	CPIC: <i>Implication:</i> Mildly reduced metabolism <i>Therapeutic recommendation:</i> 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. FDA: Results in higher systemic concentrations.	CPIC, FDA
⚠ Pitolisant	Wakix	CYP2D6	🔴 Poor Metabolizer	Results in higher systemic concentrations. Use lowest recommended starting dosage. Refer to FDA labeling for specific dosing recommendations.	FDA
✓ Tenoxicam	Mobiflex	CYP2C9	🟡 Intermediate Metabolizer (Activity Score 1.5)	<i>Implication:</i> Mildly reduced metabolism <i>Therapeutic recommendation:</i> 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.	CPIC
⚠ Tramadol	Ultram, ConZip	CYP2D6	🔴 Poor Metabolizer	CPIC: <i>Implication:</i> Greatly reduced O-desmethyltramadol (active metabolite) formation leading to diminished analgesia. <i>Therapeutic recommendation:</i> Avoid tramadol use because of possibility of diminished analgesia. If opioid use is warranted, consider a non-codeine opioid. FDA: Results in lower systemic active metabolite concentrations and may result in reduced efficacy.	CPIC, FDA

Cardiovascular

7 drugs

USE AS DIRECTED 0

No drugs in this category.

USE WITH CAUTION 6

Carvedilol

CYP2D6

Hydralazine

NAT2

Mavacamten

CYP2C19

Metoprolol

CYP2D6

Propafenone

CYP2D6

Warfarin

CYP2C9, CYP4F2, VKORC1

CONSIDER ALTERNATIVE 1

Clopidogrel

CYP2C19

Each card shows the gene driving the recommendation. Use as directed = your genetics suggest a typical response. Use with caution = consider dose adjustment or monitoring. Consider alternative = guidelines suggest discussing a different drug with your provider.

Antiarrhythmics

GENERIC NAME	BRAND NAMES	GENE	YOUR GENE PHENOTYPE	IMPLICATION	SOURCE
 Propafenone	Rythmol SR	CYP2D6	 Poor Metabolizer	Results in higher systemic concentrations and higher adverse reaction risk (arrhythmia). Avoid use in poor metabolizers taking a CYP3A4 inhibitor.	FDA

Antihypertensives

GENERIC NAME	BRAND NAMES	GENE	YOUR GENE PHENOTYPE	IMPLICATION	SOURCE
 Hydralazine	Apresoline	NAT2	 Poor Metabolizer	<i>Implication:</i> 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. <i>Therapeutic recommendation:</i> 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.	CPIC

Beta Blockers

GENERIC NAME	BRAND NAMES	GENE	YOUR GENE PHENOTYPE	IMPLICATION	SOURCE
 Carvedilol	Coreg, Coreg CR	CYP2D6	 Poor Metabolizer	Results in higher systemic concentrations and higher adverse reaction risk (dizziness).	FDA
 Metoprolol	Lopressor, Toprol XL	CYP2D6	 Poor Metabolizer (Activity Score 0.0)	<i>Implication:</i> 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. <i>Therapeutic recommendation:</i> 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.	CPIC

Blood Thinners

GENERIC NAME	BRAND NAMES	GENE	YOUR GENE PHENOTYPE	IMPLICATION	SOURCE
 Clopidogrel	Plavix	CYP2C19	 Intermediate Metabolizer	CPIC: <i>Implication:</i> Reduced clopidogrel active metabolite formation; increased on-treatment platelet reactivity; increased risk for adverse cardiac and cerebrovascular events. <i>Therapeutic recommendation:</i> Avoid standard dose (75 mg) clopidogrel if possible. Use prasugrel or ticagrelor at standard dose if no contraindication. FDA: Results in lower systemic active metabolite concentrations, lower antiplatelet response, and may result in higher cardiovascular risk. Consider use of another platelet P2Y12 inhibitor.	CPIC , FDA
 Warfarin	Coumadin	CYP2C9	 Intermediate Metabolizer	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
		VKORC1	 Decreased expression		
		CYP4F2	 Intermediate Metabolizer		

Cardiomyopathy

GENERIC NAME	BRAND NAMES	GENE	YOUR GENE PHENOTYPE	IMPLICATION	SOURCE
 Mavacamten	Camzyos	CYP2C19	 Intermediate Metabolizer	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.	FDA

Cholesterol medications

7 drugs

USE AS DIRECTED 1

Rosuvastatin
ABCG2, SLCO1B1

USE WITH CAUTION 5

Atorvastatin
SLCO1B1

Fluvastatin
CYP2C9, SLCO1B1

Pitavastatin
SLCO1B1

Pravastatin
SLCO1B1

Simvastatin
SLCO1B1

CONSIDER ALTERNATIVE 1

Lovastatin
SLCO1B1

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GENERIC NAME	BRAND NAMES	GENE	YOUR GENE PHENOTYPE	IMPLICATION	SOURCE
⚠️ Atorvastatin	Lipitor	SLCO1B1	🟡 Decreased Function	<i>Implication:</i> Increased atorvastatin exposure as compared with normal function, which may translate to increased myopathy risk. <i>Therapeutic recommendation:</i> 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).	CPIC
⚠️ Fluvastatin	Lescol	CYP2C9	🟡 Intermediate Metabolizer (Activity Score 1.5)	<i>Combined implication:</i> 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. <i>Recommendation:</i> 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). Evidence strength: Optional From the combined CYP2C9 and SLCO1B1 table in CPIC's statin guideline. CYP2C9 is matched on its activity score.	CPIC
		SLCO1B1	🟡 Decreased Function		
⚠️ Lovastatin	Mevacor	SLCO1B1	🟡 Decreased Function	<i>Implication:</i> Increased lovastatin acid exposure as compared with normal function, which may translate to increased myopathy risk. <i>Therapeutic recommendation:</i> 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.	CPIC
⚠️ Pitavastatin	Livalo	SLCO1B1	🟡 Decreased Function	<i>Implication:</i> Increased pitavastatin exposure as compared with normal function, which may translate to increased myopathy risk. <i>Therapeutic recommendation:</i> 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).	CPIC
⚠️ Pravastatin	Pravachol	SLCO1B1	🟡 Decreased Function	<i>Implication:</i> Increased pravastatin exposure compared with normal function; typical myopathy risk with doses ≤ 40 mg. <i>Therapeutic recommendation:</i> 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.	CPIC
✅ Rosuvastatin	Crestor	ABCG2	✅ Normal Function	<i>Combined implication:</i> ABCG2: Typical myopathy risk and rosuvastatin exposure. SLCO1B1: Increased rosuvastatin exposure as compared to normal function; Typical myopathy risk with doses ≤ 20 mg. <i>Recommendation:</i> 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. Evidence strength: Strong From the combined ABCG2 and SLCO1B1 table in CPIC's statin guideline.	CPIC
		SLCO1B1	🟡 Decreased Function		
⚠️ Simvastatin	Zocor	SLCO1B1	🟡 Decreased Function	CPIC: <i>Implication:</i> Increased simvastatin acid exposure compared with normal function; increased risk of muscle side effects (myopathy). <i>Therapeutic recommendation:</i> 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. FDA: 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.	CPIC, FDA

Antiemetics

4 drugs

USE AS DIRECTED 2	USE WITH CAUTION 2	CONSIDER ALTERNATIVE 0
<div>Ondansetron CYP2D6</div> <div>Tropisetron CYP2D6</div>	<div>Dronabinol CYP2C9</div> <div>Metoclopramide CYP2D6</div>	<div>No drugs in this category.</div>

Each card shows the gene driving the recommendation. Use as directed = your genetics suggest a typical response. Use with caution = consider dose adjustment or monitoring. Consider alternative = guidelines suggest discussing a different drug with your provider.

GENERIC NAME	BRAND NAMES	GENE	YOUR GENE PHENOTYPE	IMPLICATION	SOURCE
⚠️ Dronabinol	Syndros	CYP2C9	🟡 Intermediate Metabolizer	May result in higher systemic concentrations and higher adverse reaction risk. Monitor for adverse reactions.	FDA
⚠️ Metoclopramide	Reglan	CYP2D6	🔴 Poor Metabolizer	Results in higher systemic concentrations and higher adverse reaction risk. The recommended dosage is lower. Refer to FDA labeling for specific dosing recommendations.	FDA
✅ Ondansetron	Zofran	CYP2D6	🔴 Poor Metabolizer	<i>Implication:</i> Insufficient evidence demonstrating clinical impact <i>Therapeutic recommendation:</i> No recommendation based on insufficient evidence	CPIC
✅ Tropisetron	Navoban	CYP2D6	🔴 Poor Metabolizer	<i>Implication:</i> Insufficient evidence demonstrating clinical impact <i>Therapeutic recommendation:</i> No recommendation based on insufficient evidence	CPIC

Proton pump inhibitors

4 drugs

USE AS DIRECTED 0	USE WITH CAUTION 4	CONSIDER ALTERNATIVE 0
<div>No drugs in this category.</div>	<div>Dexlansoprazole CYP2C19</div> <div>Lansoprazole CYP2C19</div> <div>Omeprazole CYP2C19</div> <div>Pantoprazole CYP2C19</div>	<div>No drugs in this category.</div>

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GENERIC NAME	BRAND NAMES	GENE	YOUR GENE PHENOTYPE	IMPLICATION	SOURCE
⚠️ Dexlansoprazole	Dexilant	CYP2C19	🟡 Intermediate Metabolizer	<i>Implication:</i> Increased plasma concentration of PPI compared with CYP2C19 normal metabolizers; increased chance of efficacy and potentially toxicity <i>Therapeutic recommendation:</i> Initiate standard starting daily dose. For chronic therapy (>12 weeks) and efficacy achieved, consider 50% reduction in daily dose and monitor for continued efficacy.	CPIC
⚠️ Lansoprazole	Prevacid	CYP2C19	🟡 Intermediate Metabolizer	<i>Implication:</i> Increased plasma concentration of PPI compared with CYP2C19 normal metabolizers; increased chance of efficacy and potentially toxicity <i>Therapeutic recommendation:</i> Initiate standard starting daily dose. For chronic therapy (>12 weeks) and efficacy achieved, consider 50% reduction in daily dose and monitor for continued efficacy.	CPIC
⚠️ Omeprazole	Prilosec, Losec	CYP2C19	🟡 Intermediate Metabolizer	<i>Implication:</i> Increased plasma concentration of PPI compared with CYP2C19 normal metabolizers; increased chance of efficacy and potentially toxicity <i>Therapeutic recommendation:</i> Initiate standard starting daily dose. For chronic therapy (>12 weeks) and efficacy achieved, consider 50% reduction in daily dose and monitor for continued efficacy.	CPIC
⚠️ Pantoprazole	Protonix	CYP2C19	🟡 Intermediate Metabolizer	CPIC: <i>Implication:</i> Increased plasma concentration of PPI compared with CYP2C19 normal metabolizers; increased chance of efficacy and potentially toxicity <i>Therapeutic recommendation:</i> Initiate standard starting daily dose. For chronic therapy (>12 weeks) and efficacy achieved, consider 50% reduction in daily dose and monitor for continued efficacy. FDA: No FDA guidance for your genotype	CPIC, FDA

Oncology

13 drugs

USE AS DIRECTED 11

Belinostat
UGT1A1

Belzutifan
CYP2C19

Capecitabine
DPYD

Erdafitinib
CYP2C9

Fluorouracil
DPYD

Irinotecan
UGT1A1

Mercaptopurine
NUDT15, TPMT

Nilotinib
UGT1A1

Pazopanib
UGT1A1

Sacituzumab Govitecan-Hziy
UGT1A1

Thioguanine
NUDT15, TPMT

USE WITH CAUTION 1

Gefitinib
CYP2D6

CONSIDER ALTERNATIVE 1

Tamoxifen
CYP2D6

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Chemotherapies

GENERIC NAME	BRAND NAMES	GENE	YOUR GENE PHENOTYPE	IMPLICATION	SOURCE
✓ Belinostat	Beleodaq	UGT1A1	⚠ Intermediate Metabolizer	No FDA guidance for your genotype	FDA
✓ Belzutifan	Welireg	CYP2C19	⚠ Intermediate Metabolizer	No FDA guidance for this phenotype	FDA
✓ Capecitabine	Xeloda, Xitabin, Kapetral	DPYD	✓ Normal Metabolizer (Activity Score 2.0)	CPIC: <i>Implication:</i> Normal DPD activity and "normal" risk for fluoropyrimidine toxicity <i>Therapeutic recommendation:</i> Based on genotype, there is no indication to change dose or therapy. Use label-recommended dosage and administration FDA: No FDA guidance for your genotype	CPIC, FDA
✓ Erdafitinib	Balversa	CYP2C9	⚠ Intermediate Metabolizer	No FDA guidance for your genotype	FDA
✓ Fluorouracil	Adrucil, Carac	DPYD	✓ Normal Metabolizer (Activity Score 2.0)	CPIC: <i>Implication:</i> Normal DPD activity and "normal" risk for fluoropyrimidine toxicity <i>Therapeutic recommendation:</i> Based on genotype, there is no indication to change dose or therapy. Use label-recommended dosage and administration FDA: No FDA guidance for your genotype	CPIC, FDA
⚠ Gefitinib	Iressa	CYP2D6	✗ Poor Metabolizer	Results in higher systemic concentrations and higher adverse reaction risk. Monitor for adverse reactions.	FDA
✓ Irinotecan	Camptosar, Onivyde	UGT1A1	⚠ Intermediate Metabolizer	No FDA guidance for your genotype	FDA
✓ Mercaptopurine	Purinethol	TPMT	✓ Normal Metabolizer	<i>Combined implication:</i> Both TPMT and NUDT15 predict normal thiopurine metabolism and a normal risk of myelosuppression. <i>Recommendation:</i> Initiate therapy with standard starting dose of mercaptopurine (e.g., 75 mg/m ² /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. Evidence strength: Strong From the combined TPMT and NUDT15 table in CPIC's thiopurine guideline.	CPIC
		NUDT15	✓ Normal Metabolizer		
✓ Nilotinib	Tasigna	UGT1A1	⚠ Intermediate Metabolizer	No FDA guidance for your genotype	FDA
✓ Pazopanib	Votrient	UGT1A1	⚠ Intermediate Metabolizer	No FDA guidance for your genotype	FDA
✓ Sacituzumab Govitecan-Hziy	Trodelyv	UGT1A1	⚠ Intermediate Metabolizer	No FDA guidance for this phenotype	FDA
✓ Thioguanine	Lanvis, Tabloid	TPMT	✓ Normal Metabolizer	<i>Combined implication:</i> Both TPMT and NUDT15 predict normal thiopurine metabolism and a normal risk of myelosuppression. <i>Recommendation:</i> Initiate therapy with standard starting dose of thioguanine (e.g., 40 mg/m ² /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. Evidence strength: Strong From the combined TPMT and NUDT15 table in CPIC's thiopurine guideline.	CPIC
		NUDT15	✓ Normal Metabolizer		

Estrogen Modulators

GENERIC NAME	BRAND NAMES	GENE	YOUR GENE PHENOTYPE	IMPLICATION	SOURCE
⚠ Tamoxifen	Nolvadex, Soltamox	CYP2D6	✗ Poor Metabolizer	<i>Implication:</i> Lower endoxifen concentrations compared to normal metabolizers; higher risk of breast cancer recurrence, event-free and recurrence-free survival compared to normal metabolizers. <i>Therapeutic recommendation:</i> 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.	CPIC

Immunosuppressants

4 drugs

USE AS DIRECTED 2

Abrocitinib
CYP2C19

Azathioprine
NUDT15, TPMT

USE WITH CAUTION 2

Siponimod
CYP2C9

Tacrolimus
CYP3A5

CONSIDER ALTERNATIVE 0

No drugs in this category.

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GENERIC NAME	BRAND NAMES	GENE	YOUR GENE PHENOTYPE	IMPLICATION	SOURCE
✓ Abrocitinib	Cibinqo	CYP2C19	⚠ Intermediate Metabolizer	No FDA guidance for this phenotype	FDA
✓ Azathioprine	Imuran	TPMT	✓ Normal Metabolizer	Combined implication: Both TPMT and NUDT15 predict normal thiopurine metabolism and a normal risk of myelosuppression. Recommendation: 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. Evidence strength: Strong From the combined TPMT and NUDT15 table in CPIC's thiopurine guideline.	CPIC
		NUDT15	✓ Normal Metabolizer		
⚠ Siponimod	Mayzent	CYP2C9	⚠ Intermediate Metabolizer	Results in higher systemic concentrations. Adjust dosage based on genotype. Refer to FDA labeling for specific dosing recommendations.	FDA
⚠ Tacrolimus	Prograf	CYP3A5	⚠ Intermediate Metabolizer	CPIC: <i>Implication:</i> Lower dose-adjusted trough concentrations of tacrolimus and decreased chance of achieving target tacrolimus concentrations <i>Therapeutic recommendation:</i> 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 FDA: 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.	CPIC, FDA

Antivirals

5 drugs

USE AS DIRECTED 5

Atazanavir
UGT1A1

Efavirenz
CYP2B6

Peginterferon Alfa-2A
IFNL3

Peginterferon Alfa-2B
IFNL3

Ribavirin
IFNL3

USE WITH CAUTION 0

No drugs in this category.

CONSIDER ALTERNATIVE 0

No drugs in this category.

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Antiretrovirals

GENERIC NAME	BRAND NAMES	GENE	YOUR GENE PHENOTYPE	IMPLICATION	SOURCE
✓ Atazanavir	Reyataz, Eviataz, Others	UGT1A1	⚠ Intermediate Metabolizer	Implication: Somewhat decreased UGT1A1 activity; low likelihood of bilirubin-related discontinuation of atazanavir. Therapeutic recommendation: 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	CPIC
✓ Efavirenz	Sustiva	CYP2B6	✓ Normal Metabolizer	CPIC: <i>Implication:</i> Normal efavirenz metabolism <i>Therapeutic recommendation:</i> Initiate efavirenz with standard dosing (600 mg/day) FDA: No FDA guidance for your genotype	CPIC, FDA

Antivirals

GENERIC NAME	BRAND NAMES	GENE	YOUR GENE PHENOTYPE	IMPLICATION	SOURCE
✓ Peginterferon Alfa-2A	Pegasys	IFNL3	✓ Favorable response genotype	<i>Implication:</i> Approximately 70% chance for sustained virologic response (SVR) after 48 weeks of treatment. Consider implications before initiating PEG-IFN alpha and RBV containing regimens. <i>Therapeutic recommendation:</i> 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.	CPIC
✓ Peginterferon Alfa-2B	PegIntron	IFNL3	✓ Favorable response genotype	<i>Implication:</i> Approximately 70% chance for sustained virologic response (SVR) after 48 weeks of treatment. Consider implications before initiating PEG-IFN alpha and RBV containing regimens. <i>Therapeutic recommendation:</i> 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.	CPIC
✓ Ribavirin	Copegus, Rebetol, Virazole	IFNL3	✓ Favorable response genotype	<i>Implication:</i> Approximately 70% chance for sustained virologic response (SVR) after 48 weeks of treatment. Consider implications before initiating PEG-IFN alpha and RBV containing regimens. <i>Therapeutic recommendation:</i> 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.	CPIC

Antifungals

1 drug

GENERIC NAME	BRAND NAMES	GENE	YOUR GENE PHENOTYPE	IMPLICATION	SOURCE
⚠ Voriconazole	Vfend	CYP2C19	⚠ Intermediate Metabolizer	CPIC: <i>Implication:</i> Higher dose-adjusted trough concentrations of voriconazole compared to normal metabolizers. <i>Therapeutic recommendation:</i> Initiate therapy with recommended standard of care dosing. FDA: Results in higher systemic concentrations and may result in higher adverse reaction risk.	CPIC, FDA

Anesthetics

8 drugs

USE AS DIRECTED 1	USE WITH CAUTION 0	CONSIDER ALTERNATIVE 0	INFORMATIONAL / UNABLE TO DETERMINE 7
<div>Mivacurium</div> <div>BCHE</div>	No drugs in this category.	No drugs in this category.	<div>Desflurane</div> <div>CACNA1S, RYR1</div> <div>Enflurane</div> <div>CACNA1S, RYR1</div> <div>Halothane</div> <div>CACNA1S, RYR1</div> <div>Isoflurane</div> <div>CACNA1S, RYR1</div> <div>Methoxyflurane</div> <div>CACNA1S, RYR1</div> <div>Sevoflurane</div> <div>CACNA1S, RYR1</div> <div>Succinylcholine</div> <div>BCHE, CACNA1S, RYR1</div>

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RYR1/CACNA1S screening: Not assessed — genotyping-array data. We could not determine your RYR1 and CACNA1S malignant hyperthermia susceptibility status from your genotyping-array data. These risk variants are rare, and the risk of inaccurate imputation is too high for us to report a reliable result. This is not a negative result.

[CPIC guideline](#)

GENERIC NAME	BRAND NAMES	GENE	YOUR GENE PHENOTYPE	IMPLICATION	SOURCE
Desflurane	Various brands available	RYR1	No Result	<i>Combined implication:</i> Malignant hyperthermia susceptibility could not be determined. <i>Recommendation:</i> Clinical findings, family history and clinical evaluation should guide anesthesia decisions. Evidence strength: None	CPIC
		CACNA1S	No Result		
Enflurane	Various brands available	RYR1	No Result	<i>Combined implication:</i> Malignant hyperthermia susceptibility could not be determined. <i>Recommendation:</i> Clinical findings, family history and clinical evaluation should guide anesthesia decisions. Evidence strength: None	CPIC
		CACNA1S	No Result		
Halothane	Various brands available	RYR1	No Result	<i>Combined implication:</i> Malignant hyperthermia susceptibility could not be determined. <i>Recommendation:</i> Clinical findings, family history and clinical evaluation should guide anesthesia decisions. Evidence strength: None	CPIC
		CACNA1S	No Result		
Isoflurane	Various brands available	RYR1	No Result	<i>Combined implication:</i> Malignant hyperthermia susceptibility could not be determined. <i>Recommendation:</i> Clinical findings, family history and clinical evaluation should guide anesthesia decisions. Evidence strength: None	CPIC
		CACNA1S	No Result		
Methoxyflurane	Various brands available	RYR1	No Result	<i>Combined implication:</i> Malignant hyperthermia susceptibility could not be determined. <i>Recommendation:</i> Clinical findings, family history and clinical evaluation should guide anesthesia decisions. Evidence strength: None	CPIC
		CACNA1S	No Result		
Mivacurium	Mivacron	BCHE	Normal Metabolizer	Normal BCHE activity and expected metabolism of mivacurium.	FDA
Sevoflurane	Various brands available	RYR1	No Result	<i>Combined implication:</i> Malignant hyperthermia susceptibility could not be determined. <i>Recommendation:</i> Clinical findings, family history and clinical evaluation should guide anesthesia decisions. Evidence strength: None	CPIC
		CACNA1S	No Result		
Succinylcholine	Quelicin, Anectine	BCHE	Normal Metabolizer	Normal BCHE activity and expected metabolism of succinylcholine.	FDA
Succinylcholine	Various brands available	RYR1	No Result	<i>Combined implication:</i> Malignant hyperthermia susceptibility could not be determined. <i>Recommendation:</i> Clinical findings, family history and clinical evaluation should guide anesthesia decisions. Evidence strength: None	CPIC
		CACNA1S	No Result		

Weight management

3 drugs

USE AS DIRECTED 1	USE WITH CAUTION 2	CONSIDER ALTERNATIVE 0
Semaglutide GLP1R	Retatrutide GIPR, GLP1R Tirzepatide GIPR, GLP1R	No drugs in this category.

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GENERIC NAME	BRAND NAMES	GENE	YOUR GENE PHENOTYPE	IMPLICATION	SOURCE
⚠️ Retatrutide	Various brands available	GLP1R	✅ Typical Response	<p>Combined implication: 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.</p> <p>Recommendation: 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.</p> <p>Evidence strength: Weak</p> <p>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.</p>	Gene2Rx
		GIPR	⚠️ Decreased Function		
✅ Semaglutide	Ozempic, Wegovy	GLP1R	✅ Typical Response	<p>Implication: 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.</p> <p>Therapeutic recommendation: Standard dosing and titration are expected to produce an average response.</p>	Gene2Rx
⚠️ Tirzepatide	Mounjaro, Zepbound	GLP1R	✅ Typical Response	<p>Combined implication: 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.</p> <p>Recommendation: 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.</p> <p>Evidence strength: Moderate</p> <p>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.</p>	Gene2Rx
		GIPR	⚠️ Decreased Function		

Antidiabetics

1 drug

GENERIC NAME	BRAND NAMES	GENE	YOUR GENE PHENOTYPE	IMPLICATION	SOURCE
✅ Nateglinide	Starlix	CYP2C9	⚠️ Intermediate Metabolizer	No FDA guidance for this phenotype	FDA

Antihistamines

1 drug

GENERIC NAME	BRAND NAMES	GENE	YOUR GENE PHENOTYPE	IMPLICATION	SOURCE
⚠️ Meclizine	Antivert	CYP2D6	❌ Poor Metabolizer	May affect systemic concentrations. Monitor for adverse reactions and clinical effect.	FDA

Drugs used in addictive disorders

1 drug

GENERIC NAME	BRAND NAMES	GENE	YOUR GENE PHENOTYPE	IMPLICATION	SOURCE
⚠️ Lofexidine	Lucemyra	CYP2D6	❌ Poor Metabolizer	Results in higher systemic concentrations and higher adverse reaction risk. Monitor for orthostatic hypotension and bradycardia.	FDA

Female sexual health

1 drug

GENERIC NAME	BRAND NAMES	GENE	YOUR GENE PHENOTYPE	IMPLICATION	SOURCE
 Filibanserin	Addyi	CYP2C19	 Intermediate Metabolizer	No FDA guidance for your genotype	FDA

Gaucher's disease treatments

1 drug

GENERIC NAME	BRAND NAMES	GENE	YOUR GENE PHENOTYPE	IMPLICATION	SOURCE
 Eliglustat	Cerdelga	CYP2D6	 Poor Metabolizer	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.	FDA

Gout

1 drug

GENERIC NAME	BRAND NAMES	GENE	YOUR GENE PHENOTYPE	IMPLICATION	SOURCE
 Allopurinol	Zyloprim	ABCG2	 Normal Function	Normal ABCG2 transporter function. Renal and intestinal uric acid excretion is not impaired by ABCG2 variation at p.Gln141Lys.	DPWG

Hair loss

1 drug

GENERIC NAME	BRAND NAMES	GENE	YOUR GENE PHENOTYPE	IMPLICATION	SOURCE
 Minoxidil (topical)	Rogaine	SULT1A1	 Normal Function	<i>Implication:</i> Your SULT1A1 result suggests normal enzyme function. This enzyme helps activate topical minoxidil, but hair growth results can vary. <i>Therapeutic recommendation:</i> Use topical minoxidil as directed and assess hair growth over time with your clinician.	Gene2Rx

Saliva production stimulators

1 drug

GENERIC NAME	BRAND NAMES	GENE	YOUR GENE PHENOTYPE	IMPLICATION	SOURCE
 Cevimeline	Evxac	CYP2D6	 Poor Metabolizer	May result in higher adverse reaction risk. Use with caution.	FDA

Urologicals

1 drug

GENERIC NAME	BRAND NAMES	GENE	YOUR GENE PHENOTYPE	IMPLICATION	SOURCE
 Tolterodine	Detrol	CYP2D6	 Poor Metabolizer	Results in higher systemic concentrations and higher adverse reaction risk (QT prolongation).	FDA

Other substances

7 drugs

USE AS DIRECTED 2

Alcohol
ADH1B, ALDH2

Ketamine
CYP2B6

USE WITH CAUTION 5

Caffeine
CYP1A2

LSD
CYP2D6

MDMA
COMT, CYP2D6

Nicotine
CHRNA5, COMT, CYP2A6

THC
AKT1, COMT, CYP2C9, FAAH

CONSIDER ALTERNATIVE 0

No drugs in this category.

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GENERIC NAME	BRAND NAMES	GENE	YOUR GENE PHENOTYPE	IMPLICATION	SOURCE
✓ Alcohol		ADH1B	✓ Normal Function	<i>Implication:</i> 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. <i>Therapeutic recommendation:</i> Follow standard guidelines for alcohol consumption.	Gene2Rx
		ALDH2	✓ Normal Function	<i>Implication:</i> Two Glu504 alleles (rs671 G/G, ALDH2*1/*1). Normal acetaldehyde clearance; typical risk of flushing, hangover and alcohol dependence for this gene. <i>Therapeutic recommendation:</i> Standard advice on drinking limits.	
⚠ Caffeine	Coffee, Tea	CYP1A2	⚡ Rapid Metabolizer	<i>Implication:</i> 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. <i>Therapeutic recommendation:</i> Caffeine may be cleared somewhat faster than average. Standard advice on moderate intake applies.	Gene2Rx
✓ Ketamine	Ketalar	CYP2B6	✓ Normal Metabolizer	<i>Implication:</i> 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. <i>Therapeutic recommendation:</i> Initiate with standard ketamine doses per clinical practice and titrate to effect.	Gene2Rx
⚠ LSD	Acid	CYP2D6	✗ Poor Metabolizer	<i>Implication:</i> 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. <i>Therapeutic recommendation:</i> 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.	Gene2Rx
⚠ MDMA	Ecstasy	COMT	⚡ Intermediate Function	<i>Implication:</i> One rs4680 G and one A allele (Val158/Met158). Intermediate COMT activity; no distinct cardiovascular or subjective pattern was reported for this genotype. <i>Therapeutic recommendation:</i> No genotype-based adjustment. Watch for unexpected cognitive or cardiovascular effects.	Gene2Rx
		CYP2D6	✗ Poor Metabolizer	<i>Implication:</i> 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. <i>Therapeutic recommendation:</i> 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	Cigarettes, Zyn	CHRNA5	⚡ Increased Risk	<i>Implication:</i> 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. <i>Therapeutic recommendation:</i> Higher risk of heavy, persistent use. For patients who want to quit, offer cessation pharmacotherapy with counseling rather than an unassisted attempt.	Gene2Rx

GENERIC NAME	BRAND NAMES	GENE	YOUR GENE PHENOTYPE	IMPLICATION	SOURCE	
		COMT	🟡 Intermediate Function	<i>Implication:</i> rs4680 Val/Met. Moderately lower COMT activity. Associations with nicotine reward, withdrawal and smoking behavior are inconsistent across studies. <i>Therapeutic recommendation:</i> No genotype-based change to cessation treatment; monitor craving as usual.	Gene2Rx	
		CYP2A6	🟢 Normal Metabolizer	<i>Implication:</i> 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. <i>Therapeutic recommendation:</i> Typical response to nicotine. In smokers with normal nicotine metabolism, varenicline was more effective than the nicotine patch in a randomized trial.	Gene2Rx	
⚠️	THC	Cannabis, Marijuana	AKT1	🟡 Decreased Function	<i>Implication:</i> 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. <i>Therapeutic recommendation:</i> 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.	Gene2Rx
		COMT	🟡 Intermediate Function	<i>Implication:</i> One rs4680 G and one A allele (Val158/Met158). Intermediate COMT activity and average dopamine clearance. <i>Therapeutic recommendation:</i> No COMT-based adjustment. A typical response to THC is expected.	Gene2Rx	
		CYP2C9	🟡 Intermediate Metabolizer (Activity Score 1.5)	<i>Implication:</i> 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. <i>Therapeutic recommendation:</i> Initiate at standard doses. Monitor for increased sedation or psychotropic intensity.	Gene2Rx	
		FAAH	🟢 Normal Function	<i>Implication:</i> Two rs324420 C alleles (Pro129). Usual hydrolysis of anandamide and related endocannabinoids, so baseline cannabinoid receptor tone is typical. FAAH does not metabolize THC. <i>Therapeutic recommendation:</i> No FAAH-based adjustment. Response to THC is expected to match population norms.	Gene2Rx	

What do I do now?

If you find that you may have an atypical response to a medication you take or are considering taking, it is important that you first consult with your healthcare provider or a genetic counselor before making any changes.

Should I change medications or dosage based on my report?

No! Do not alter your medication dosage or stop taking your medication without first consulting your healthcare provider.

Why shouldn't I change my medication based on this report?

Direct-to-consumer data is not clinical grade, so anything included in the report should be used as a conversation starter with your healthcare provider to seek the appropriate clinical laboratory test.

Are these expert annotations?

The source is identified beside each finding. This report includes CPIC, FDA, DPWG, and Gene2Rx interpretations with different levels of evidence. Gene2Rx interpretations are not necessarily endorsed by those organizations. Gene2Rx interpretations explain the supporting research and its limitations alongside the finding.

More questions?

Contact us at contact@gene2rx.com.