Gene2Rx

Psychiatric Pharmacogenetics Report

Report Information

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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 drugs used for psychiatric purposes, including but not limited to depression, bipolar disorder, schizophrenia, and ADHD. This report does not contain information about all drugs used for psychiatric purposes, only those that have known pharmacogenetic interactions. 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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Table of Contents

Table of Contents 2

Therapeutic Guidance Legend 4

Antidepressants 4

- Antidepressants - SNRI 4
- Antidepressants - SSRI 5
- Antidepressants - TCA 5

Antipsychotics 6

Psychostimulants 7

Pharmacogenetics Summary

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
✓	**CYP2B6**	*1/*1	Normal Metabolizer
↓	**CYP2C19**	*1/*2	Intermediate Metabolizer
✕	**CYP2D6**	*4/*4	Poor Metabolizer (Activity Score 0.0)
✓	**CYP3A4**	*1/*1	Normal Metabolizer

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

Pharmacogenetic Results

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	USE WITH CAUTION 6	CONSIDER ALTERNATIVE 8
No drugs in this category.	Citalopram CYP2C19	Amitriptyline CYP2C19, CYP2D6
	Escitalopram CYP2C19	Clomipramine CYP2C19, CYP2D6
	Fluvoxamine CYP2D6	Desipramine CYP2D6
	Paroxetine CYP2D6	Doxepin CYP2C19, CYP2D6
	Sertraline CYP2B6, CYP2C19	Imipramine CYP2C19, CYP2D6
	Vortioxetine CYP2D6	Nortriptyline CYP2D6
		Trimipramine CYP2C19, CYP2D6
		Venlafaxine 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**: *Implication:* 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. *Therapeutic recommendation:* 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**: *Implication:* Reduced metabolism when compared with CYP2C19 normal metabolizers. Higher plasma concentrations may increase the probability of side effects. *Therapeutic recommendation:* 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	*Implication:* Reduced metabolism when compared with CYP2C19 normal metabolizers. Higher plasma concentrations may increase the probability of side effects. *Therapeutic recommendation:* Initiate therapy with recommended starting dose. Consider a slower titration schedule and lower maintenance dose than normal metabolizers.	CPIC
⚠	Fluvoxamine	Luvox	CYP2D6	Poor Metabolizer	*Implication:* Greatly reduced metabolism of fluvoxamine to less active compounds compared with normal metabolizers. Higher plasma concentrations may increase the probability of side effects. *Therapeutic recommendation:* 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	*Implication:* Greatly reduced metabolism compared with CYP2D6 normal metabolizers. Higher plasma concentrations may increase the probability of side effects. *Therapeutic recommendation:* 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	*Combined implication:* CYP2C19: Reduced metabolism of sertraline to less active compounds when compared to CYP2C19 normal metabolizers. CYP2B6: Normal metabolism of sertraline to less active compounds. *Recommendation:* 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**: *Implication:* Greatly reduced metabolism of vortioxetine to inactive compounds compared with normal metabolizers. Higher plasma concentrations may increase the probability of side effects. *Therapeutic recommendation:* 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

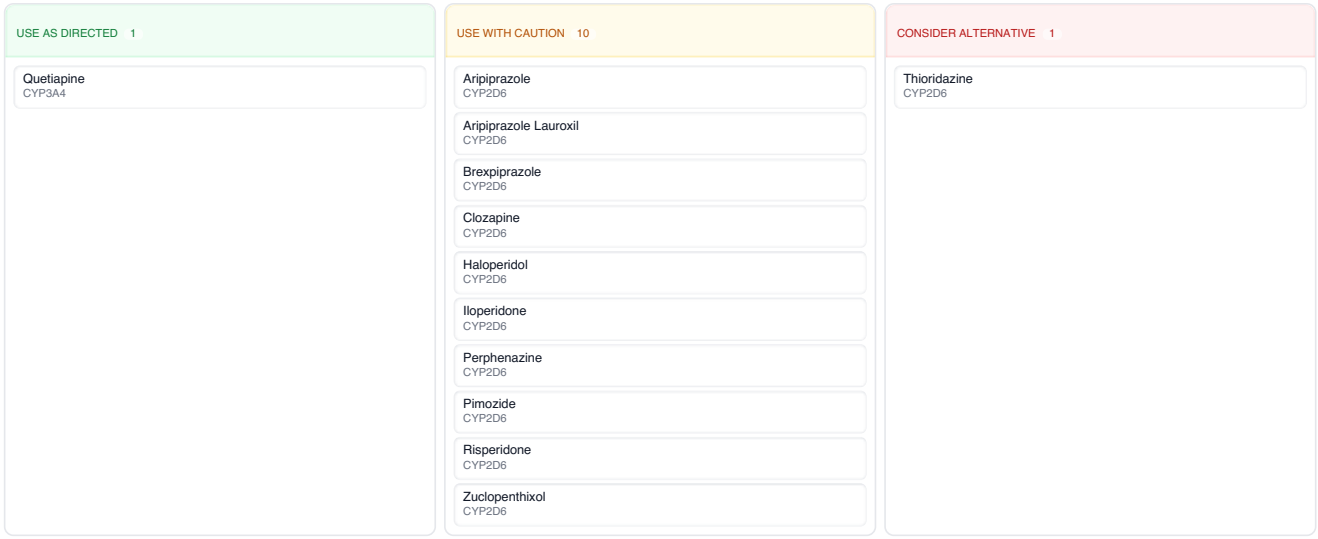
Antidepressants - TCA

	GENERIC NAME	BRAND NAMES	GENE	YOUR GENE PHENOTYPE	IMPLICATION	SOURCE
⚠	Amitriptyline	Elavil	CYP2D6	Poor Metabolizer (Activity Score 0.0)	*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 CYP2C19: Reduced metabolism of tertiary amines compared to normal metabolizers *Recommendation:* Avoid amitriptyline use. If a amitripyline 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	CYP2D6	Poor Metabolizer (Activity Score 0.0)	*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 CYP2C19: Reduced metabolism of tertiary amines compared to normal metabolizers *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. 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		
⚠	Desipramine	Norpramin	CYP2D6	Poor Metabolizer	*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.	CPIC
⚠	Doxepin	Sinequan, Quitaxon, Aponal	CYP2D6	Poor Metabolizer (Activity Score 0.0)	*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 CYP2C19: Reduced metabolism of tertiary amines compared to normal metabolizers *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. 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		
⚠	Imipramine	Tofranil	CYP2D6	Poor Metabolizer (Activity Score 0.0)	*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 CYP2C19: Reduced metabolism of tertiary amines compared to normal metabolizers *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. 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		
⚠	Nortriptyline	Pamelor	CYP2D6	Poor Metabolizer	*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.	CPIC
⚠	Trimipramine	Surmontil	CYP2D6	Poor Metabolizer (Activity Score 0.0)	*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 CYP2C19: Reduced metabolism of tertiary amines compared to normal metabolizers *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. 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		

Antipsychotics

12 drugs



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
⚠	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	Abilify	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)	**CPIC**: *Implication:* 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. *Therapeutic recommendation:* 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. **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.	CPIC, FDA

Frequently Asked Questions

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.