

Patient ID <b>SA00175314</b>	Patient Name <b>TESTINGRNV, PGXQP ABNORMAL</b>	Birth Date <b>2007-07-07</b>	Sex <b>F</b>	Age <b>17</b>
Order Number <b>SA00175314</b>	Client Order Number <b>SA00175314</b>	Ordering Physician <b>CLIENT,CLIENT</b>	Report Notes	
Account Information <b>C7028846 DLMP Rochester</b>		Collected <b>21 Apr 2025 00:00</b>		

### Pharmacogenomic Interactions

amitriptyline <i>Elavil</i>	meloxicam <i>Mobic</i>
amoxapine <i>Asendin</i>	nortriptyline <i>Pamelor</i>
atomoxetine <i>Strattera</i>	omeprazole
atorvastatin <i>Lipitor</i>	<i>Prilosec, Zegerid, OmePPI</i>
avatrombopag <i>Doptelet</i>	oxycodone
celecoxib <i>Celebrex</i>	pantoprazole <i>Protonix</i>
citalopram <i>Celexa</i>	paroxetine <i>Paxil</i>
clomipramine <i>Anafranil</i>	phenytoin <i>Phenytek, Dilantin</i>
desipramine <i>Norpramin</i>	piroxicam <i>Feldene</i>
dexlansoprazole <i>Dexilant</i>	protriptyline <i>Vivactil</i>
doxepin <i>Sinequan</i>	risperidone <i>Risperdal</i>
dronabinol <i>Marinol, THC</i>	rosuvastatin <i>Crestor</i>
elagolix <i>Orilissa</i>	sertraline <i>Zoloft</i>
escitalopram <i>Lexapro</i>	simvastatin <i>FloLipid, Zocor</i>
flecainide <i>Tambocor</i>	siponimod <i>Mayzent</i>
flurbiprofen <i>Ocufen</i>	tacrolimus
fluvoxamine <i>Luvox</i>	<i>Envarsus, Protopic, Astagraf</i>
fosphenytoin <i>Cerebyx</i>	tamoxifen <i>Nolvadex, Soltamox</i>
ibuprofen	tenoxicam <i>Mobiflex</i>
imipramine <i>Tofranil</i>	trimipramine <i>Surmontil</i>
lansoprazole <i>Prevacid</i>	venlafaxine <i>Effexor</i>
meclizine	voriconazole <i>Vfend</i>
<i>Medi-Meclizine, Bonine, Motion Sickness, Verticalm</i>	warfarin <i>Coumadin, Jantoven</i>

### Standard Prescription Recommended

amphetamine	gefitinib <i>Iressa</i>
aripiprazole <i>Abilify</i>	haloperidol <i>Haldol</i>
brexpiprazole <i>Rexulti</i>	iloperidone <i>Fanapt</i>
brivaracetam <i>Briviact</i>	lofexidine <i>Lucemyra</i>
carisoprodol <i>Soma</i>	metoclopramide <i>Reglan</i>
carvedilol <i>Coreg</i>	metoprolol <i>Toprol, Lopressor</i>
cevimeline <i>Evoxac</i>	mirabegron <i>Myrbetriq</i>
clobazam <i>Onfi</i>	nebivolol <i>Bystolic</i>
clopidogrel <i>Plavix</i>	oliceridine <i>Olinvyk</i>
clozapine <i>Clozaril</i>	ondansetron <i>Zuplenz, Zofran</i>
codeine	perphenazine <i>Trilafon</i>
darifenacin <i>Enablex</i>	pimozide <i>Orap</i>
deutetrabenazine <i>Austedo</i>	propafenone <i>Rythmol</i>
diazepam <i>Valium</i>	propranolol <i>Inderal, Innopran</i>
donepezil <i>Aricept</i>	tamsulosin <i>Flomax</i>
eliglustat <i>Cerdelga</i>	tetrabenazine <i>Xenazine</i>
erdafitinib <i>Balversa</i>	thioridazine <i>Mellaril</i>
esomeprazole <i>Nexium</i>	tolterodine <i>Detrol</i>
fesoterodine <i>Toviaz</i>	tramadol <i>Ultram, ConZip</i>
flibanserin <i>Addyi</i>	tropisetron
fluoxetine <i>Prozac</i>	valbenazine <i>Ingrezza</i>
galantamine <i>Razadyne</i>	vortioxetine <i>Trintellix</i>

### Pharmacogenomic Interaction Details

Medication	Comment
amitriptyline <i>Elavil</i>	According to the Clinical Pharmacogenetics Implementation Consortium (CPIC) guideline for tricyclic antidepressants, individuals with decreased CYP2D6 activity are expected to demonstrate decreased metabolism of amitriptyline, which may lead to increased plasma concentrations of the active medication and a higher probability of adverse effects; individuals with increased CYP2C19 metabolism are expected to convert tertiary amines to secondary amines at a greater rate, which may affect response or adverse effects. This individual is expected to demonstrate decreased CYP2D6 activity and increased CYP2C19 activity; therefore, consider selecting an alternate medication.

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Medication	Comment
<b>amoxapine</b> <i>Asendin</i>	According to the FDA label, individuals with reduced CYP2D6 metabolism may have higher than expected plasma concentrations of amoxapine when administered a standard dose.
<b>atomoxetine</b> <i>Strattera</i>	Standard dosing is recommended; however, according to a Clinical Pharmacogenetic Implementation Consortium guideline, this individual may be at an increased risk of adverse events due to decreased CYP2D6-mediated metabolism. Monitor carefully while increasing to the target dose and consider a dose reduction if adverse effects are noted.
<b>atorvastatin</b> <i>Lipitor</i>	Monitor for the presence of adverse events. According to the Dutch Pharmacogenetics Working Group guidelines, the risk of myopathy may be increased with this genotype.
<b>avatrombopag</b> <i>Doptelet</i>	According to the FDA label, individuals with reduced CYP2C9 metabolism may have higher than expected plasma concentrations of avatrombopag when administered a standard dose and may be at increased risk for adverse events.
<b>celecoxib</b> <i>Celebrex</i>	Increased potential for adverse events. According to the FDA label and the Clinical Pharmacogenetics Implementation Consortium (CPIC) guideline for CYP2C9 and NSAIDs, individuals with decreased CYP2C9 activity may have higher systemic concentrations of celecoxib and may require a reduced dosage. For poor metabolizers, the FDA label recommends reducing the starting dose to half of the lowest recommended dose. CPIC recommends initiating therapy at 25-50% of the lowest recommended starting dose, with dose titration upward to clinical effect or 25-50% of the maximum recommended dose with caution. Upward titration is not recommended until after steady-state is reached. Use of the lowest effective dosage for the shortest duration consistent with individual patient treatment goals is recommended. See the CPIC guideline for more details. The FDA label recommends consideration of alternate therapy in patients with juvenile rheumatoid arthritis.
<b>citalopram</b> <i>Celexa</i>	According to the Clinical Pharmacogenetics Implementation Consortium guideline for selective serotonin reuptake inhibitors, there is a potential for lack of efficacy due to increased CYP2C19-mediated metabolism. Consider an alternate medication not predominantly metabolized by CYP2C19.
<b>clomipramine</b> <i>Anafranil</i>	According to the Clinical Pharmacogenetics Implementation Consortium (CPIC) guideline for tricyclic antidepressants, individuals with decreased CYP2D6 activity are expected to demonstrate decreased metabolism of clomipramine, which may lead to increased plasma concentrations of the active medication and a higher probability of adverse effects; individuals with increased CYP2C19 metabolism are expected to convert tertiary amines to secondary amines at a greater rate, which may affect response or adverse effects. This individual is expected to demonstrate decreased CYP2D6 activity and increased CYP2C19 activity; therefore, consider selecting an alternate medication.
<b>desipramine</b> <i>Norpramin</i>	According to the Clinical Pharmacogenetics Implementation Consortium (CPIC) guideline for tricyclic antidepressants (TCAs), individuals with decreased CYP2D6 activity are expected to demonstrate decreased metabolism of TCAs, which may lead to increased plasma concentrations of the active medication and a higher probability of adverse effects. This individual is expected to demonstrate decreased CYP2D6 activity. Consider a 25% reduction of the recommended starting dose.

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Medication	Comment
<b>dexlansoprazole</b> <i>Dexilant</i>	Increased risk for therapeutic failure. According to the Clinical Pharmacogenetics Implementation Consortium (CPIC) guideline for CYP2C19 and proton pump inhibitors (PPIs), individuals with ultrarapid CYP2C19 activity may have decreased systemic concentrations of PPIs and may be at risk for therapeutic failure and require a dose adjustment. CPIC recommends increasing the starting daily dose by 100%, which may be given in divided doses, and monitoring for efficacy. See the CPIC guideline for more details.
<b>doxepin</b> <i>Sinequan</i>	According to the Clinical Pharmacogenetics Implementation Consortium (CPIC) guideline for tricyclic antidepressants, individuals with decreased CYP2D6 activity are expected to demonstrate decreased metabolism of doxepin, which may lead to increased plasma concentrations of the active medication and a higher probability of adverse effects; individuals with increased CYP2C19 metabolism are expected to convert tertiary amines to secondary amines at a greater rate, which may affect response or adverse effects. This individual is expected to demonstrate decreased CYP2D6 activity and increased CYP2C19 activity; therefore, consider selecting an alternate medication.
<b>dronabinol</b> <i>Marinol, THC</i>	Increased potential for adverse reactions. According to the FDA label, individuals with reduced CYP2C9 metabolism may have higher than expected plasma concentrations of dronabinol when administered a standard dose. Monitor for adverse reactions.
<b>elagolix</b> <i>Orilissa</i>	According to the FDA label, individuals with the SLCO1B1 521 C/C genotype are expected to have a 78% mean increase in eligolix concentration compared to individuals with normal transporter function; however, a dose adjustment is not required based on SLCO1B1 status.
<b>escitalopram</b> <i>Lexapro</i>	According to the Clinical Pharmacogenetics Implementation Consortium guideline for selective serotonin reuptake inhibitors, there is a potential for lack of efficacy due to increased CYP2C19-mediated metabolism. Consider an alternate medication not predominantly metabolized by CYP2C19.
<b>flecainide</b> <i>Tambocor</i>	According to the Dutch Pharmacogenetics Working Group guidelines, CYP2D6 intermediate metabolizers may convert flecainide to inactive metabolites at a decreased rate, and thus may be at increased risk for adverse events (QT prolongation) at standard doses. Consider initiating therapy with a reduced dose, monitoring the plasma medication concentration, and obtaining an ECG.
<b>flurbiprofen</b> <i>Ocufen</i>	Increased potential for adverse events. According to the FDA label and the Clinical Pharmacogenetics Implementation Consortium (CPIC) guideline for CYP2C9 and NSAIDs, individuals with decreased CYP2C9 activity may have higher systemic concentrations of flurbiprofen and may require a reduced dosage. For poor metabolizers, the FDA label recommends reducing the starting dose to half of the lowest recommended dose. CPIC recommends initiating therapy at 25-50% of the lowest recommended starting dose, with dose titration upward to clinical effect or 25-50% of the maximum recommended dose with caution. Upward titration is not recommended until after steady-state is reached. Use of the lowest effective dosage for the shortest duration consistent with individual patient treatment goals is recommended. See the CPIC guideline for more details. The FDA label recommends consideration of alternate therapy in patients with juvenile rheumatoid arthritis.

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Medication	Comment
<b>fluvoxamine</b> <i>Luvox</i>	According to the Clinical Pharmacogenetics Implementation Consortium guideline for selective serotonin reuptake inhibitors, there may be potential for adverse events due to decreased CYP2D6-mediated metabolism; however, initiation with standard dose is recommended.
<b>fosphenytoin</b> <i>Cerebyx</i>	Consider testing for HLA-B*15:02 prior to prescription. According to the CPIC guideline, a typical initial/loading dose is recommended, followed by a reduction (by approximately 50%) for subsequent doses. Subsequent doses should be adjusted according to therapeutic drug monitoring, response, and adverse effects.
<b>ibuprofen</b>	Increased potential for adverse events. According to the FDA label and the Clinical Pharmacogenetics Implementation Consortium (CPIC) guideline for CYP2C9 and NSAIDs, individuals with decreased CYP2C9 activity may have higher systemic concentrations of ibuprofen and may require a reduced dosage. For poor metabolizers, the FDA label recommends reducing the starting dose to half of the lowest recommended dose. CPIC recommends initiating therapy at 25-50% of the lowest recommended starting dose, with dose titration upward to clinical effect or 25-50% of the maximum recommended dose with caution. Upward titration is not recommended until after steady-state is reached. Use of the lowest effective dosage for the shortest duration consistent with individual patient treatment goals is recommended. See the CPIC guideline for more details. The FDA label recommends consideration of alternate therapy in patients with juvenile rheumatoid arthritis.
<b>imipramine</b> <i>Tofranil</i>	According to the Clinical Pharmacogenetics Implementation Consortium (CPIC) guideline for tricyclic antidepressants, individuals with decreased CYP2D6 activity are expected to demonstrate decreased metabolism of imipramine, which may lead to increased plasma concentrations of the active medication and a higher probability of adverse effects; individuals with increased CYP2C19 metabolism are expected to convert tertiary amines to secondary amines at a greater rate, which may affect response or adverse effects. This individual is expected to demonstrate decreased CYP2D6 activity and increased CYP2C19 activity; therefore, consider selecting an alternate medication.
<b>lansoprazole</b> <i>Prevacid</i>	Increased risk for therapeutic failure. According to the Clinical Pharmacogenetics Implementation Consortium (CPIC) guideline for CYP2C19 and proton pump inhibitors (PPIs), individuals with ultrarapid CYP2C19 activity may have decreased systemic concentrations of PPIs and may be at risk for therapeutic failure and require a dose adjustment. CPIC recommends increasing the starting daily dose by 100%, which may be given in divided doses, and monitoring for efficacy. See the CPIC guideline for more details.
<b>meclizine</b> <i>Medi-Meclizine, Bonine, Motion Sickness, Verticalm</i>	Potential for adverse events. According to the FDA label, CYP2D6 intermediate metabolizers have reduced clearance of meclizine and should be monitored for adverse events.
<b>meloxicam</b> <i>Mobic</i>	According to the Clinical Pharmacogenetics Implementation Consortium (CPIC) Guideline for NSAIDs, individuals with reduced CYP2C9 metabolism may be at increased risk of toxicity when treated with standard doses. Consider selecting an alternate therapy not metabolized by CYP2C9 or an NSAID metabolized by CYP2C9 that has a shorter half-life.

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Medication	Comment
<b>nortriptyline</b> <i>Pamelor</i>	According to the Clinical Pharmacogenetics Implementation Consortium (CPIC) guideline for tricyclic antidepressants (TCAs), individuals with decreased CYP2D6 activity are expected to demonstrate decreased metabolism of TCAs, which may lead to increased plasma concentrations of the active medication and a higher probability of adverse effects. This individual is expected to demonstrate decreased CYP2D6 activity. Consider a 25% reduction of the recommended starting dose.
<b>omeprazole</b> <i>Prilosec, Zegerid, OmePPI</i>	Increased risk for therapeutic failure. According to the Clinical Pharmacogenetics Implementation Consortium (CPIC) guideline for CYP2C19 and proton pump inhibitors (PPIs), individuals with ultrarapid CYP2C19 activity may have decreased systemic concentrations of PPIs and may be at risk for therapeutic failure and require a dose adjustment. CPIC recommends increasing the starting daily dose by 100%, which may be given in divided doses, and monitoring for efficacy. See the CPIC guideline for more details.
<b>oxycodone</b>	Potential for insufficient analgesia. Data are conflicting on the association of CYP2D6 phenotype and oxycodone analgesic effect and toxicity. An alternate medication such as hydrocodone may be considered with monitoring for efficacy. Concomitant use of CYP3A4 inducers may also contribute to potential for insufficient analgesia.
<b>pantoprazole</b> <i>Protonix</i>	Increased risk for therapeutic failure. According to the Clinical Pharmacogenetics Implementation Consortium (CPIC) guideline for CYP2C19 and proton pump inhibitors (PPIs), individuals with ultrarapid CYP2C19 activity may have decreased systemic concentrations of PPIs and may be at risk for therapeutic failure and require a dose adjustment. CPIC recommends increasing the starting daily dose by 100%, which may be given in divided doses, and monitoring for efficacy. See the CPIC guideline for more details.
<b>paroxetine</b> <i>Paxil</i>	According to the Clinical Pharmacogenetics Implementation Consortium guideline for selective serotonin reuptake inhibitors, there is a potential for adverse events due to reduced CYP2D6-mediated metabolism; however, initiation with standard dose is recommended. Monitor carefully.
<b>phenytoin</b> <i>Phenytek, Dilantin</i>	Consider testing for HLA-B*15:02 prior to prescription. According to the CPIC guideline, a typical initial/loading dose is recommended, followed by a reduction (by approximately 50%) for subsequent doses. Subsequent doses should be adjusted according to therapeutic drug monitoring, response, and adverse effects.
<b>piroxicam</b> <i>Feldene</i>	According to the FDA label and the Clinical Pharmacogenetics Implementation Consortium (CPIC) guideline for CYP2C9 and NSAIDs, individuals with decreased CYP2C9 activity may have higher systemic concentrations of piroxicam and may be at increased risk of adverse reactions. CPIC recommends selection of an alternate therapy not metabolized by CYP2C9 or metabolized by CYP2C9 but with a shorter half-life. The FDA label suggests consideration of a reduced dose. See the CPIC guideline and FDA label for more details.
<b>protriptyline</b> <i>Vivactil</i>	According to the CPIC guideline for tricyclic antidepressants, there is a potential for adverse events when individuals with this CYP2D6 phenotype are treated with secondary amines. While protriptyline is not specifically mentioned in the guideline, it is metabolized through the same pathways and a similar risk for adverse events may be expected. Consider reduction of the starting dose and use of therapeutic drug monitoring to further titrate the dose.

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Medication	Comment
<b>risperidone</b> <i>Risperdal</i>	Decreased CYP2D6-mediated metabolism may result in higher risperidone and lower 9-hydroxyrisperidone concentrations. Some literature suggests that dosage adjustment or use of an alternate therapy may be advised, while other studies and the FDA label indicate that there is limited evidence of a clinical impact of these differences in medication/metabolite concentrations and that a standard dose may be appropriate.
<b>rosuvastatin</b> <i>Crestor</i>	According to the FDA label, individuals with this SLCO1B1 genotype have higher than expected systemic concentrations of rosuvastatin. Increased rosuvastatin levels have been reported with this genotype, but have not definitively been associated with myopathy or reduced efficacy.
<b>sertraline</b> <i>Zoloft</i>	According to the Clinical Pharmacogenetics Implementation Consortium guideline for selective serotonin reuptake inhibitors, there is a potential for lack of efficacy due to increased CYP2C19-mediated metabolism. Initiate with standard dose; if patient does not respond as expected, consider an alternate medication not predominantly metabolized by CYP2C19.
<b>simvastatin</b> <i>FloLipid, Zocor</i>	According to the FDA label and Clinical Pharmacogenetics Implementation Consortium (CPIC) guideline for simvastatin, individuals with this SLCO1B1 genotype have higher than expected systemic concentrations of simvastatin and may be at risk for adverse reactions (myopathy). The risk of adverse reaction (myopathy) is higher for patients on 80 mg than for those on lower doses. CPIC recommends considering a lower dose or an alternate medication.
<b>siponimod</b> <i>Mayzent</i>	According to the FDA label, the recommended maintenance dosage for individuals with this CYP2C9 genotype is 1 mg once daily. See the FDA label for details, including instructions for titration for treatment initiation.
<b>tacrolimus</b> <i>Envarsus, Protopic, Astagraf</i>	Increased doses may be required. According to the FDA label and the Clinical Pharmacogenetics Implementation Consortium (CPIC) guideline for CYP3A5 and tacrolimus dosing, individuals with intermediate CYP3A5 activity have lower systemic tacrolimus concentrations and a lower probability of achieving target tacrolimus concentrations when taking a standard dose. Therapeutic drug monitoring should be used to guide dose adjustments. See the FDA label and CPIC guideline for more information.
<b>tamoxifen</b> <i>Nolvadex, Soltamox</i>	According to the FDA label and CPIC guideline for tamoxifen, this individual may have a lower than expected concentration of the active metabolite, endoxifen, and a poor response to tamoxifen. CPIC recommends considering hormonal therapy such as an aromatase inhibitor for postmenopausal women or aromatase inhibitor along with ovarian function suppression in premenopausal women. If aromatase inhibitor use is contraindicated, consideration should be given to use a higher but FDA approved tamoxifen dose (40 mg/day). Avoid CYP2D6 inhibitors.
<b>tenoxicam</b> <i>Mobiflex</i>	According to the Clinical Pharmacogenetics Implementation Consortium (CPIC) guideline for CYP2C9 and NSAIDs, individuals with decreased CYP2C9 activity may have higher systemic concentrations of tenoxicam and may be at increased risk of adverse reactions. CPIC recommends selection of an alternate therapy not metabolized by CYP2C9 or metabolized by CYP2C9 but with a shorter half-life. See the CPIC guideline for more details.

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<b>trimipramine</b> <i>Surmontil</i>	According to the Clinical Pharmacogenetics Implementation Consortium guideline for tricyclic antidepressants, individuals with decreased CYP2D6 activity are expected to demonstrate decreased metabolism of trimipramine, which may lead to increased plasma concentrations of the active medication and a higher probability of adverse effects; individuals with increased CYP2C19 metabolism are expected to convert tertiary amines to secondary amines at a greater rate, which may affect response or adverse effects. This individual is expected to demonstrate decreased CYP2D6 activity and increased CYP2C19 activity; therefore, consider selecting an alternate medication.
<b>venlafaxine</b> <i>Effexor</i>	The Dutch Pharmacogenetics Working Group guidelines suggest considering using therapeutic drug monitoring to titrate or selecting an alternate medication not predominantly metabolized by CYP2D6 if standard dosing is not effective.
<b>voriconazole</b> <i>Vfend</i>	According to the Clinical Pharmacogenetics Implementation Consortium (CPIC) guideline for CYP2C19 and voriconazole therapy, individuals who are CYP2C19 ultrarapid metabolizers have a decreased probability of attaining therapeutic concentrations with standard dosing. Therefore, consider an alternate medication (e.g. isavuconazole, liposomal amphotericin B, posaconazole).
<b>warfarin</b> <i>Coumadin, Jantoven</i>	This patient's CYP2C9 and VKORC1 genotype suggests that a significant warfarin dose decrease may be required to maintain optimal INR. Initial warfarin dosing recommendations based on the CYP2C9/VKORC1 genotype are available in the drug label. In addition, this patient is positive for the CYP4F2*3 allele (rs2108622 T). For patients who self-identify as being of non-African ancestry, the presence of the CYP4F2*3 allele suggests that this patient may require a slightly increased warfarin dose than predicted by CYP2C9/VKORC1 alone. Currently, there is no evidence to support a role of this variant on warfarin dosing in patients of African ancestry. Furthermore, the rs12777823 A allele was detected. For patients who self-identify as being of African ancestry, the presence of the rs12777823 A allele suggests that this patient may require a decreased warfarin dose than that predicted by CYP2C9/VKORC1 alone. Currently, there is no evidence to support a role of this variant on warfarin dosing in patients of non-African ancestry.

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## Genotype Findings

Analyte	Result	Performing Site
<b>CYP1A2 Genotype</b>	*1/*6	MCR
<b>CYP1A2 Phenotype</b>	Intermediate metabolizer This individual is expected to metabolize CYP1A2 substrates at a slower rate than normal. Caution should be exercised when using CYP1A2 substrates.	MCR
<b>CYP2C19 Genotype</b>	*17/*17	MCR
<b>CYP2C19 Phenotype</b>	Ultrarapid metabolizer For prodrugs that are activated by CYP2C19, increased drug activation is expected and may result in increased risk for adverse reactions; for drugs that are inactivated by CYP2C19, increased drug inactivation is expected which may result in lower blood levels of the parent drug and poorer response.	MCR
<b>CYP2C9 Genotype</b>	*2/*3	MCR
<b>CYP2C9 Phenotype</b>	Poor metabolizer This patient has a genotype associated with minimal to no CYP2C9 enzyme activity. Caution should be exercised when treating with drugs metabolized by CYP2C9. Dose reduction or use of an alternate medication metabolized through a different pathway may be considered.	MCR
<b>CYP2C9 Activity Score</b>	0.50	MCR
<b>CYP2D6 Genotype</b>	*68+*4/*59	MCR
<b>CYP2D6 Phenotype</b>	Intermediate metabolizer Prodrugs are converted to their active metabolite at a reduced rate which may lead to decreased efficacy for some drugs. Alternatively, drugs that are inactivated by CYP2D6 are metabolized at a reduced rate which may result in an increased risk of adverse effects.	MCR
<b>CYP2D6 Activity Score</b>	0.50	MCR
<b>CYP3A4 Genotype</b>	*1/*8	MCR
<b>CYP3A4 Phenotype</b>	Intermediate metabolizer Drugs that are inactivated or activated by CYP3A4 are metabolized at a reduced rate.	MCR
<b>CYP3A5 Genotype</b>	*1/*3	MCR

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MCR	Mayo Clinic Laboratories - Rochester Main Campus	200 First Street SW, Rochester, MN 55905	Nikola Baumann Ph.D.	24D0404292

Patient ID <b>SA00175314</b>	Patient Name <b>TESTINGRNV, PGXQP ABNORMAL</b>	Birth Date <b>2007-07-07</b>	Sex <b>F</b>	Age <b>17</b>
Order Number <b>SA00175314</b>	Client Order Number <b>SA00175314</b>	Ordering Physician <b>CLIENT,CLIENT</b>	Report Notes	
Account Information <b>C7028846 DLMP Rochester</b>		Collected <b>21 Apr 2025 00:00</b>		

Analyte	Result	Performing Site
<b>CYP3A5 Phenotype</b>	Intermediate metabolizer  This patient is a CYP3A5 expresser and is expected to have increased CYP3A5 metabolism compared to individuals with the common CYP3A5*3/*3 genotype. Higher doses of some medications metabolized by CYP3A5 may be required because original dosing recommendations for some CYP3A5-metabolized medications were determined based on populations primarily comprised of CYP3A5 poor metabolizers (i.e. CYP3A5*3/*3). Therapeutic drug monitoring is recommended for applicable medications.	<b>MCR</b>
<b>SLC01B1 Genotype</b>	*5/*5	<b>MCR</b>
<b>SLC01B1 Phenotype</b>	Poor function  SLC01B1 encodes the organic anion-transporting polypeptide 1B1 (OATP1B1) influx transporter located on the basolateral membrane of hepatocytes. OATP1B1 facilitates the hepatic uptake of statins as well as other endogenous compounds (e.g. bilirubin). This individual is expected to have decreased transport of some substrates; however, there may be a variable impact of this genetic variation among substrates. This individual is positive for the c.521T>C variant that is commonly studied and associated with simvastatin-associated myopathy.	<b>MCR</b>
<b>Warfarin CYP2C9 Genotype</b>	*2/*3	<b>MCR</b>
<b>Warfarin VKORC1 Resistance Genotype</b>	No resistance variants detected	<b>MCR</b>
<b>Warfarin VKORC1 Promoter Genotype</b>	A/A	<b>MCR</b>
<b>Warfarin CYP2C9 and VKORC1 Promoter Phenotype</b>	High warfarin sensitivity  CYP2C9 is the primary enzyme responsible for metabolism of S-warfarin, while VKORC1 encodes the vitamin K epoxide reductase protein, which is the target of warfarin. Initial warfarin dosing recommendations based on the CYP2C9/VKORC1 genotype are available in the drug label.	<b>MCR</b>
<b>Warfarin CYP4F2 *3 Genotype</b>	*1/*3  CYP4F2 is a vitamin K oxidase that limits excessive accumulation of vitamin K. For patients who self-identify as being of non-African ancestry, the CYP4F2*3 allele has been demonstrated to affect enzyme activity and to be associated with a modest influence on warfarin dose requirements. Currently, there is no evidence to support a role of this variant on warfarin dosing in patients of African ancestry.	<b>MCR</b>

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Analyte	Result	Performing Site
<b>Warfarin rs12777823 Genotype</b>	G/A The rs12777823 variant is located within the CYP2C cluster, and is associated with significant alterations in warfarin clearance in individuals of African American ancestry. Although this variant is identified in other populations, the association with warfarin dose requirements has only been identified among African Americans.	<b>MCR</b>

**Additional Information**
**MCR**

Initial warfarin dosing recommendations based on the CYP2C9/VKORC1 genotype are available in the drug label located online at: [www.accessdata.fda.gov/drugsatfda\\_docs/label/2010/009218s108lbl.pdf](http://www.accessdata.fda.gov/drugsatfda_docs/label/2010/009218s108lbl.pdf). For additional information related to CYP4F2\*3 (rs2108622) and rs12777823, please see the Clinical Pharmacogenomics Implementation Consortium Guideline for Pharmacogenetics-Guided Warfarin Dosing: 2017 Update (Clin Pharmacol Ther. 2017 Feb 15. doi: 10.1002/cpt.668). Medications and recommendations included in this report are based on the Clinical Pharmacogenetics Implementation Consortium Guidelines [www.cpicpgx.org/guidelines/](http://www.cpicpgx.org/guidelines/), information publicly available in PharmGKB [www.pharmgkb.org](http://www.pharmgkb.org), Dutch Pharmacogenetics Working Group Recommendations [www.pharmgkb.org](http://www.pharmgkb.org), FDA medication labels, and available literature. For additional information regarding pharmacogenomic genes and their associated drugs, please see the Pharmacogenomic Associations Tables on the Mayo Clinic Laboratories webpage, [https://www.mayocliniclabs.com/it-mmfiles/Pharmacogenomic\\_Associations\\_Tables.pdf](https://www.mayocliniclabs.com/it-mmfiles/Pharmacogenomic_Associations_Tables.pdf). This resource also includes information regarding enzyme inhibitors and inducers, as well as potential alternate drug choices. Please note that the information at this link is educational material intended for health care professionals and may not be comprehensive. This educational material is not intended to supersede the care provider's experience and knowledge of her/his patient to establish a diagnosis or a treatment plan. All medications require careful clinical monitoring. Please contact the laboratory at 1-800-533-1710 for further information about pharmacogenomic testing. For additional information on star allele nomenclature for the Cytochrome P450 enzymes, see the Pharmacogene Variation Consortium website [www.pharmvar.org](http://www.pharmvar.org).

**Method**
**MCR**

Genotyping is performed using a PCR-based 5'-nuclease assay. Fluorescently labeled detection probes anneal to the target DNA. PCR is used to amplify the segment of DNA that contains the polymorphism. If the detection probe is an exact match to the target DNA, the 5'-nuclease polymerase degrades the probe, the reporter dye is released from the effects of the quencher dye, and a fluorescent signal is detected. Genotypes are assigned based on the allele-specific fluorescent signals that are detected. (TaqMan SNP Genotyping Assays User Guide, Applied Biosystems)

**Disclaimer**
**1 MCR**

Targeted variant analysis performed by a polymerase chain reaction (PCR)-based 5'-nuclease assay using fluorescently labeled detection probes was used to test for the presence or absence of specific variants in the following genes. Pharmacogenomic data for these specific variants are reviewed and reported (if present): CYP1A2 (NM\_000761.4) \*1F, \*1K, \*6, and \*7 CYP2C9 (NM\_000771.3) \*2, \*3, \*4, \*5, \*6, \*8, \*9, \*11, \*12, \*13, \*14, \*15, \*16, \*17, \*18, \*25, \*26, \*28, \*30, \*33, and \*35 CYP2C19 (NM\_000769.1) \*2, \*3, \*4, \*5, \*6, \*7, \*8, \*9, \*10, \*17, and \*35 CYP2D6 (NM\_000106.4) \*2, \*3, \*4, \*4N, \*5, \*6, \*7, \*8, \*9, \*10, \*11, \*12, \*13, \*14, \*15, \*17, \*29, \*35, \*36, \*41, \*59, \*68, \*114, and CYP2D6 gene duplication. Additional CYP2D6 variants may be detected through the cascade testing process. CYP3A4 (NM\_017460.5) \*8, \*11, \*12, \*13, \*16, \*17, \*18, \*22, and \*26 CYP3A5 (NM\_000777.4) \*3, \*6, \*7, \*8, and \*9 CYP4F2 (NM\_001082.4) \*3 rs12777823G>A SLCO1B1 (NM\_006446.4) \*5 VKORC1 (NM\_024006.5) c.-1639G>A, c.85G>T, c.106G>T, c.121G>T, c.134T>C, c.172A>G, c.196G>A, c.358C>T, and

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c.383T>G

A two-tiered testing approach was used to identify CYP2D6 variants (including copy number variants). Tier 1 (always performed) consists of targeted variant analysis and a test for copy number variation (CNV) using CYP2D6-specific probes for the promoter, intron 6 and exon 9. Detectable CNVs include duplications, multiplications and deletions (\*5) of CYP2D6, as well as CYP2D6::CYP2D7 (i.e. \*4N, \*36, \*68) and CYP2D7::CYP2D6 (i.e. \*13) hybrid genes. Tier 2, which is only performed when the phenotype in Tier 1 is ambiguous, consists of comprehensive Sanger sequencing of the CYP2D6 gene and/or CYP2D7::CYP2D6 and CYP2D6::CYP2D7 hybrid genes. For additional clinical information, see Cytochrome P450 2D6 (CYP2D6) Comprehensive Cascade (test ID 2D6Q).

For additional information on star allele nomenclature, please see the Pharmacogene Variation Consortium website ([www.pharmvar.org](http://www.pharmvar.org)). Please contact the laboratory at 1-800-533-1710 for further information about pharmacogenomic testing.

**CAUTIONS:**  
**CLINICAL CORRELATIONS**

This test is not designed to provide specific dosing recommendations and is to be used only as an aid to clinical decision making. Drug-label guidance should be used when dosing patients with medications, regardless of the predicted phenotype. Test results should be interpreted in the context of clinical findings, family history, and other laboratory data.

**TECHNICAL LIMITATIONS**

Pharmacological phenotype prediction and interpretation is based on the limited dataset of the specific variants/alleles interrogated. This test will not detect all variants that may cause

abnormal drug metabolism or drug response. Rare variants may be present that could lead to false negative or positive results. If results obtained do not match the clinical findings (phenotype), additional testing should be considered. Assignment of a \*1 allele indicates that none of the alleles of interest were detected, but does not rule out the presence of other variants in the gene. For additional information regarding the standard Human Genome Variation Society (HGVS) nomenclature associated with these variants, please see the Mayo Clinic Laboratories test catalog for this test.

The methods used to genotype may not identify the precise configuration of variants or alleles (in the case of CYP2D6) on a patient's chromosomes; therefore, this lab will report the most likely diplotype based upon reported or observed frequencies. Note that this ambiguity can be clarified by family studies, if desired. Samples may contain donor DNA if obtained from patients who received non-leukoreduced blood transfusions or allogeneic hematopoietic stem cell transplantation. Results from samples obtained under these circumstances may not accurately reflect the recipient's genotype. For individuals who have received blood transfusions, the genotype usually reverts to that of the recipient within 6 weeks. For individuals who have received allogeneic hematopoietic stem cell transplantation, a pre-transplant DNA specimen is recommended for testing. Pharmacogenetic test results in patients who have undergone liver transplantation may not accurately reflect the patient's drug metabolism status.

**Reviewed by**

Ann Marie Moyer, M.D., Ph.D.

MCR

**Received:** 21 Apr 2025 14:25

**Reported:** 21 Apr 2025 15:14

**Laboratory Notes**

- 1 This test was developed and its performance characteristics determined by Mayo Clinic in a manner consistent with CLIA requirements. This test has not been cleared or approved by the U.S. Food and Drug Administration.

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