Ascend Healthcare

Pharmacogenomics (PGx) Report

Sample Information

Patient: Ascend Healthcare
Date of Birth: Apr 24, 2024
Sex: female

Physician: Ascend Healthcare
Practice: Ascend Healthcare

Lab Information

TruDiagnostic, Inc.
881 Corporate Dr • Lexington, KY 40503
Phone: (833) 963-1700
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CLIA ID Number: 18D2183496
https://trudiagnostic.com

This report combines (i) an analysis of the patient's DNA by TruDiagnostic, Inc., identifying relevant genetic variants that are informative for medication efficacy, safety, and dosing, with (ii) an interpretation of the identified DNA variants by GeneAcuity to bring you immediately actionable clinical guidance regarding safer, more effective medications and dosages for the patient. The Medication Report section lists the type of PGx guidance present on FDA-approved drug labels. Medications with no established FDA PGx guidance are provided solely for educational purposes.

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My Medications

Analyzed medication items include:

GeneAcuity does not identify risks concerning the medication list supplied for the following risk vectors: Pharmacogenetic risks, lifestyle factors, drug-to-drug interactions, anticholinergic burden, contraindications, FDA boxed warnings, AGS Beers criteria

Drug	Finding	Recommendation	Evidence

- Typical response is expected
- Consider alternative therapy
- Change recommended
- Additional information available
- Response is uncertain
- Strong
- Moderate
- Emerging

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Medications Summary

Class	Standard Precautions	Caution / Additional Info	High Risk / Change Recommended
Antidepressants	Bupropion (ANKK1) Bupropion (CYP2B6) Moclobemide Sertraline (CYP2C19) Citalopram Escitalopram Doxepin (2C19) Trimipramine (2C19) Amitriptyline (2C19) Clomipramine (2C19) Desipramine and Imipramine (2C19) Amitriptyline (2D6) Clomipramine (2D6) Desipramine (2D6) Imipramine (2D6) Doxepin (2D6) Trimipramine (2D6) Vortioxetine Nortriptyline Amoxapine Mirtazapine	Fluvoxamine Sertraline (CYP2B6) Paroxetine Fluoxetine Protriptyline Dapoxetine Duloxetine Trazodone	Venlafaxine
Antipsychotics	Haloperidol Brexpiprazole Aripiprazole Zuclopenthixol Pimozide Quetiapine Clozapine (1A2) Olanzapine (2D6) Flupenthixol	Perphenazine Risperidone Iloperidone Clozapine (2D6) Aripiprazole Lauroxil Sertindole	Thioridazine
Antibiotics	Dapsone Nitrofurantoin		

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Class	Standard Precautions	Caution / Additional Info	High Risk / Change Recommended
Cardiovascular Agents	Flecainide Propafenone Metoprolol	Carvedilol Nebivolol Propranolol Timolol	
Antithrombotics	Clopidogrel Prasugrel Warfarin (2C9) Ticagrelor (2C19)	Warfarin (4F2) Warfarin (VKORC1) Phenprocoumon Acenocoumarol Ticagrelor	
Analgesics	Oxycodone (2D6) Tramadol Codeine Celecoxib Flurbiprofen Ibuprofen Lornoxicam Piroxicam Tenoxicam Meloxicam Methadone (CYP2B6) Nevirapine (CYP2B6) Diclofenac Alfentanil Hydromorphone Morphine Sufentanil (OPRM1)	Hydrocodone Oliceridine Dihydrocodeine Oxycodone (3A4) Oxycodone (3A5) Buprenorphine Fentanyl (3A4) Sufentanil (3A4)	
ADHD	Amphetamine (COMT) Dextroamphetamine (COMT) Lisdexamfetamine (COMT) Methylphenidate (COMT) Dexmethylphenidate (COMT) Atomoxetine	Amphetamine (CYP2D6) Dextroamphetamine (CYP2D6) Lisdexamfetamine (CYP2D6) Viloxazine	

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Class	Standard Precautions	Caution / Additional Info	High Risk / Change Recommended
Statins	Rosuvastatin (SLCO1B1) Simvastatin Pitavastatin Pravastatin Fluvastatin (SLCO1B1) Atorvastatin (SLCO1B1) Lovastatin (SLCO1B1)	Fluvastatin (2C9) Atorvastatin (CYP3A4)	
Antifungals	Voriconazole	Ketoconazole	
Anxiolytics	Clobazam Diazepam	Buspirone Alprazolam Clonazepam	
Immunosuppressants	Sirolimus Thioguanine (NUDT15) Mercaptopurine (NUDT15) Azathioprine (NUDT15) Thioguanine (TPMT) Azathioprine (TPMT) Mercaptopurine (TPMT)	Cyclosporine	
Anticonvulsants	Clobazam Brivaracetam Lacosamide	Phenytoin Fosphenytoin	
Proton Pump Inhibitors	Dexlansoprazole Esomeprazole Lansoprazole Omeprazole Pantoprazole Rabeprazole		

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Class	Standard Precautions	Caution / Additional Info	High Risk / Change Recommended
Antiemetics	Ondansetron Tropisetron Meclizine	Dronabinol Metoclopramide	
Antimetabolites	Methotrexate		
Antineoplastics	Belzutifan Erdafitinib Cisplatin Ospemifene (CYP3A4, CYP2C9) Belinostat Dolutegravir Erlotinib Nilotinib Pazopanib	Gefitinib	Tamoxifen
Central Nervous System Agents		Siponimod Tetrabenazine Dextromethorphan/Quinidine (Nuedexta) Valbenazine Deutetrabenazine Eszopiclone	
Antidiabetics	Gliclazide Tolbutamide Glimepiride Glyburide/Glibenclamide Glipizide Nateglinide	Saxagliptin	
Genitourinary Agents		Tolterodine Fesoterodine Tamsulosin Mirabegron Darifenacin	

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Class	Standard Precautions	Caution / Additional Info	High Risk / Change Recommended
Additional Medications	Donepezil Pegloticase Tafenoquine Primaquine Eltrombopag Lusutrombopag (F5) Tacrolimus Pitolisant Abrocitinib Carisoprodol Estrogen-containing Oral Contraceptives Methylene Blue Dextromethorphan (2B6) Flibanserin Toluidine Blue Rasburicase Elagolix Lesinurad Avatrombopag (F5) Mavacamten Irinotecan	Atazanavir Lofexidine Galantamine Efavirenz Avatrombopag (CYP2C9) Lusutrombopag (F2) Cevimeline Dextromethorphan (2D6) Ranolazine Tolperisone Avatrombopag (F2) Vorapaxar Guanfacine Peginterferon alfa-2b Peginterferon alfa-2a	

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Medication Report Details (by therapeutic class)

Drug	Finding	Recommendation	Evidence
SSRI Antidepressants			
Citalopram (Celexa) *Based on CPIC Guidelines*	Citalopram (CYP2C19): Normal Metabolism	Normal Metabolism. No adjustments needed from typical dosing strategies	
Dapoxetine (Priligy, EJ-30) *SwissMedic Actionable PGx*	Dapoxetine (CYP2D6): Poor Metabolism	Caution should be exercised in patients known to be of the CYP2D6 slow metaboliser genotype or in patients treated with potent CYP2D6 inhibitors at the same time. An increase of the dose to 60 mg should not be applied to these patients.	
Escitalopram (Lexapro) *Based on CPIC Guidelines*	Escitalopram (CYP2C19): Normal Metabolism	Normal Metabolism. No adjustments needed from typical dosing strategies	
Fluoxetine (Prozac) *FDA Drug label: Actionable PGx*	Fluoxetine (CYP2D6): Poor Metabolism	Results in slower rate of S-fluoxetine metabolism and higher concentrations. Currently no recommendation from the FDA. No adjustments needed from typical dosing strategies	
Fluvoxamine (Luvox) *Based on CPIC Guidelines*	Fluvoxamine (CYP2D6): Poor Metabolism	Greatly reduced metabolism when compared to normal metabolizers. Higher plasma concentrations may increase the probability of side effects. Consider a 25-50% reduction of recommended starting dose and titrate to response or use an alternative drug not metabolized by CYP2D6.	
Paroxetine (Paxil) *Based on CPIC Guidelines*	Paroxetine (CYP2D6): Poor Metabolism	Greatly reduced metabolism when compared to normal metabolizers. Higher plasma concentrations may increase the probability of side effects. Select alternative drug not predominantly metabolized by CYP2D6 or if paroxetine use warranted, consider a 50% reduction of recommended starting dose and titrate to response.	
Sertraline (Zoloft) *CPIC (Feb 2023)*	Sertraline (CYP2B6): Intermediate Metabolism	Reduced metabolism of sertraline to less active compounds when compared to CYP2B6 normal metabolizers. Initiate therapy with recommended starting dose. Consider a slower titration schedule and lower maintenance dose than CYP2B6 normal metabolizers.	

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Drug	Finding	Recommendation	Evidence
SSRI Antidepressants			
Sertraline (Zoloft) *Based on CPIC Guidelines*	Sertraline (CYP2C19): Normal Metabolism	Normal Metabolism. No adjustments needed from typical dosing strategies	
Drug	**Finding**	**Recommendation**	**Evidence**
TCA Antidepressants			
Amitriptyline (Elavil) *Based on CPIC Guidelines*	Amitriptyline (CYP2C19): Normal Metabolism	Normal Metabolism. No adjustments needed from typical dosing strategies	
Amitriptyline (Elavil) *Based on CPIC Guidelines*	Amitriptyline (CYP2D6): Poor Metabolism	Greatly reduced metabolism of TCAs (including amitriptyline, clomipramine, desipramine, doxepin, imipramine, and trimipramine) to less active compounds compared to normal metabolizers. Higher plasma concentrations of active drug will increase the probability of side effects. 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.	
Amoxapine (Asendin) *FDA Drug label: Actionable PGx*	Amoxapine (CYP2D6): Poor Metabolism	May result in higher systemic concentrations and higher adverse reaction risk. Consider dosage reductions in poor metabolizers.	
Clomipramine (Anafranil, Clomicalm) *Based on CPIC Guidelines*	Clomipramine (CYP2C19): Normal Metabolism	Normal Metabolism. No adjustments needed from typical dosing strategies	

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Drug	Finding	Recommendation	Evidence
TCA Antidepressants			
Clomipramine (Anafranil, Clomicalm) *Based on CPIC Guidelines*	Clomipramine (CYP2D6): Poor Metabolism	Greatly reduced metabolism of TCAs (including amitriptyline, clomipramine, desipramine, doxepin, imipramine, and trimipramine) to less active compounds compared to normal metabolizers. Higher plasma concentrations of active drug will increase the probability of side effects. 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.	
Desipramine (Pertofrane, Norpramin) *Based on DPWG Guidelines*	Desipramine and Imipramine (CYP2C19): Normal Metabolism	Normal Metabolism. No adjustments needed from typical dosing strategies	
Desipramine (Pertofrane, Norpramin) *Based on CPIC Guidelines*	Desipramine (CYP2D6): Poor Metabolism	Greatly reduced metabolism of TCAs (including amitriptyline, clomipramine, desipramine, doxepin, imipramine, and trimipramine) to less active compounds compared to normal metabolizers. Higher plasma concentrations of active drug will increase the probability of side effects. Avoid tricyclic use due to potential for side effects. Consider alternative drug not metabolized by CYP2D6. If a TCA is warranted, consider 50% reduction of recommended starting dose. Utilize therapeutic drug monitoring to guide dose adjustments.	
Doxepin (Quitaxon, Aponal, Sinequan, Deptran) *Based on CPIC Guidelines*	Doxepin (CYP2C19): Normal Metabolism	Normal Metabolism. No adjustments needed from typical dosing strategies	

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Drug	Finding	Recommendation	Evidence
TCA Antidepressants			
Doxepin (Quitaxon, Aponal, Sinequan, Deptran) *Based on CPIC Guidelines*	Doxepin (CYP2D6): Poor Metabolism	Greatly reduced metabolism of TCAs (including amitriptyline, clomipramine, desipramine, doxepin, imipramine, and trimipramine) to less active compounds compared to normal metabolizers. Higher plasma concentrations of active drug will increase the probability of side effects. 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.	
Imipramine (Tofranil-PM, Tofranil) *Based on DPWG Guidelines*	Desipramine and Imipramine (CYP2C19): Normal Metabolism	Normal Metabolism. No adjustments needed from typical dosing strategies	
Imipramine (Tofranil-PM, Tofranil) *Based on CPIC Guidelines*	Imipramine (CYP2D6): Poor Metabolism	Greatly reduced metabolism of TCAs (including amitriptyline, clomipramine, desipramine, doxepin, imipramine, and trimipramine) to less active compounds compared to normal metabolizers. Higher plasma concentrations of active drug will increase the probability of side effects. 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.	
Nortriptyline (Aventyl, Pamelor) *Based on DPWG Guidelines*	Nortriptyline (CYP2D6): Poor Metabolism	Use 40% of the standard dose and monitor the effect and side effects or the plasma concentration of nortriptyline in order to set the maintenance dose. The therapeutic range of nortriptyline is 50-150 ng/mL. Values exceeding 250 ng/mL are considered toxic.	
Protriptyline (Vivactil) *FDA Drug label: Actionable PGx*	Protriptyline (CYP2D6): Poor Metabolism	May result in higher systemic concentrations and higher adverse reaction risk. Refer to FDA labeling for specific dosing recommendations and monitor patients for adverse reactions.	
Trimipramine (Surmontil) *Based on CPIC Guidelines*	Trimipramine (CYP2C19): Normal Metabolism	Normal Metabolism. No adjustments needed from typical dosing strategies	

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Drug	Finding	Recommendation	Evidence
TCA Antidepressants			
Trimipramine (Surmontil) *Based on CPIC Guidelines*	Trimipramine (CYP2D6): Poor Metabolism	Greatly reduced metabolism of TCAs (including amitriptyline, clomipramine, desipramine, doxepin, imipramine, and trimipramine) to less active compounds compared to normal metabolizers. Higher plasma concentrations of active drug will increase the probability of side effects. 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.	

Drug	Finding	Recommendation	Evidence
Other Antidepressants			
Bupropion (Wellbutrin) *FDA Drug label: Informative PGx*	Bupropion (CYP2B6): Intermediate Metabolism	Currently no recommendation from the FDA. No adjustments needed from typical dosing strategies	
Bupropion (Wellbutrin)	Bupropion (ANKK1): WT/WT	Studies have found mixed evidence on the impact of ANKK1 on Bupropion. NO action is needed for this gene-drug interaction	
Duloxetine (Cymbalta) *FDA/EMA Actionable PGx*	Duloxetine (CYP2D6): Poor Metabolism	Pharmacokinetics of Duloxetine have large intersubject variability partly due to gender, age, smoking status and CYP2D6 metabolizer status. Limited data suggests that concentrations of duloxetine are higher in CYP2D6 poor metabolizers.	
Mirtazapine (Remeron) *DPWG (Nov 2018)*	Mirtazapine (CYP2D6): Poor Metabolism	DPWG suggests Mirtazapine is not significantly impacted by CYP2D6 variants. There is insufficient evidence to provide a recommendation. NO action is needed for this gene-drug interaction	
Moclobemide (Manerix, Aurorix, Amira) *SwissMedic Drug label: Actionable PGx*	Moclobemide (CYP2C19): Normal Metabolism	Normal Metabolism. No adjustments needed from typical dosing strategies	

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Drug	Finding	Recommendation	Evidence
Other Antidepressants			
Trazodone (Oleptro, Desyrel)	Trazodone (CYP3A4): Normal Metabolism	In the available research, no interaction between genotype and metabolism has been shown. However, this medication has been found to respond to CYP3A4/CYP3A5 inhibitors and inducer. Be cautious when combining use with medications which affect CYP3A metabolism such as ketoconazole.	
Venlafaxine (Effexor) *Based on DPWG Guidelines*	Venlafaxine (CYP2D6): Poor Metabolism	There are indications of an increased risk of side effects and a reduced chance of efficacy. The gene variation reduces the conversion of venlafaxine to the active metabolite O-desmethylvenlafaxine, whilst an association between high O-desmethylvenlafaxine/venlafaxine ratios and response without side effects was found. It is not possible to offer adequately substantiated advice for dose reduction based on the literature. - avoid venlafaxine. Antidepressants that are not metabolised by CYP2D6 - or to a lesser extent - include, for example, duloxetine, mirtazapine, citalopram and sertraline. - If it is not possible to avoid venlafaxine and side effects occur: 1. reduce the dose 2. monitor the effect and side effects or check the plasma concentrations of venlafaxine and O-desmethylvenlafaxine It is not known whether it is possible to reduce the dose to such an extent that the side effects disappear, while the effectiveness is maintained. In general, it is assumed that the effectiveness is determined by the sum of the plasma concentrations of venlafaxine and O-desmethylvenlafaxine. However, the side effects do not appear to be related to this sum. Furthermore, a reduced effectiveness of venlafaxine has been observed in depression patients with this gene variation.	

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Drug	Finding	Recommendation	Evidence
Other Antidepressants			
Vortioxetine (Trintellix, Brintellix) *FDA/EMA/HCSC Drug labels: Actionable PGx*	Vortioxetine (CYP2D6): Poor Metabolism	The plasma concentration of vortioxetine is approximately two times higher in CYP2D6 poor metabolizers than in normal metabolizers. The maximum recommended dose is 10 mg/day in known CYP2D6 poor metabolizers. Reduce the dose by one half when patients are receiving a CYP2D6 strong inhibitor (e.g. bupropion, fluoxetine, paroxetine, or quinidine) concomitantly.	

Drug	Finding	Recommendation	Evidence
1st Gen Antipsychotics			
Flupenthixol (Depixol, Fluanxol) *DPWG (Nov 2018)*	Flupenthixol (CYP2D6): Poor Metabolism	DPWG suggests Flupenthixol is not significantly impacted by CYP2D6 variants. There is insufficient evidence to provide a recommendation. NO action is needed for this gene-drug interaction	
Haloperidol (Haldol) *Based on DPWG Guidelines*	Haloperidol (CYP2D6): Poor Metabolism	There are indications for an increased risk of side effects. The genetic variation leads to decreased conversion of haloperidol, resulting in plasma concentrations that are approximately 1.7-fold higher. Use 60% of the standard.	
Perphenazine (Trilafon) *FDA/PMDA Drug labels: Actionable PGx*	Perphenazine (CYP2D6): Poor Metabolism	Results in higher systemic concentrations and higher adverse reaction risk.	
Pimozide (Orap) *Based on DPWG Guidelines; FDA Drug label: Requires Testing*	Pimozide (CYP2D6): Poor Metabolism	The risk of QT-prolongation – and thereby also the risk of torsade de points – is theoretically increased, because the genetic variation results in an increase in the plasma concentration of pimozide. The elevated plasma concentration and associated theoretical increased risk of QT elongation can be negated by following the dose recommendations provided below. Use no more than the following doses (50% of the standard maximum dose): 12 years and older: 10 mg/day Younger than 12 years: 0.05 mg/kg per day to a maximum of 2 mg/day	

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Drug	Finding	Recommendation	Evidence
1st Gen Antipsychotics			
Thioridazine (Mellaril-S, Mellaril, Melleril) *FDA Drug label: Actionable PGx*	Thioridazine (CYP2D6): Poor Metabolism	Results in higher systemic concentrations and higher adverse reaction risk (QT prolongation). Predicted effect based on experience with CYP2D6 inhibitors. Contraindicated in poor metabolizers.	
Zuclopenthixol (Cisordinol, Clopixol) *Based on DPWG Guidelines*	Zuclopenthixol (CYP2D6): Poor Metabolism	The risk of side effects may be elevated. The genetic variation results in a decreased conversion of zuclopentixol, which causes the plasma concentration to be approximately 1.6-fold higher. Use with 50% of the standard dose.	
Drug	**Finding**	**Recommendation**	**Evidence**
2nd Gen Antipsychotics			
Aripiprazole (Abilify) *Based on DPWG Guidelines*	Aripiprazole (CYP2D6): Poor Metabolism	The risk of side effects is increased. The genetic variation leads to an increase in the sum of the plasma concentrations of aripiprazole and the active metabolite. Administer no more than 10 mg/day or 300 mg/month (68-75% of the standard maximum dose of aripiprazole).	
Aripiprazole Lauroxil (Aristada Initio, Aristada) *FDA Drug label: Actionable PGx*	Aripiprazole Lauroxil (CYP2D6): Poor Metabolism	May result in higher systemic concentrations and higher adverse reaction risk. Consider dosage reductions to 441 mg from 662 mg, 882 mg, or 1064 mg. No dosage adjustment is necessary in patients taking 441 mg, if tolerated.	
Brexpiprazole (Rexulti) *Based on DPWG Guidelines*	Brexpiprazole (CYP2D6): Poor Metabolism	The risk of side effects is theoretically increased, because the gene variation reduces the metabolism of brexpiprazole. Use half of the standard dose.	
Clozapine (Clozaril, Leponex, Versacloz) *Based on DPWG Guidelines*	Clozapine (CYP1A2): Normal Metabolism	This is NOT a gene-drug interaction; no action is necessary	
Clozapine (Clozaril, Leponex, Versacloz) *FDA Drug label: Actionable PGx*	Clozapine (CYP2D6): Poor Metabolism	Results in higher systemic concentrations. Dosage reductions may be necessary	
Iloperidone (Fanapt) *FDA Drug label: Actionable PGx*	Iloperidone (CYP2D6): Poor Metabolism	Results in higher systemic concentrations and higher adverse reaction risk (QT prolongation). Reduce dosage by 50%.	

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Drug		Finding	Recommendation	Evidence
2nd Gen Antipsychotics				
Olanzapine (Zalasta, Zyprexa) *DPWG (May 2021)*	?	Olanzapine (CYP2D6): Poor Metabolism	DPWG concludes there is NO gene-drug interaction. NO action is necessary	
Quetiapine (Seroquel) *Based on DPWG Guidelines*	✓	Quetiapine (CYP3A4): Normal Metabolism	Normal Metabolism. No adjustments needed from typical dosing strategies	
Risperidone (Risperdal) *Based on DPWG Guidelines*	!	Risperidone (CYP2D6): Poor Metabolism	The percentage of patients with therapy failure increased from 16% to 26%. The gene variation increases the plasma concentration of risperidone plus the active metabolite and increases the proportion of risperidone in this ratio, which is more effective at crossing the blood-brain barrier. Use 67% of the standard dose. If problematic side effects originating in the central nervous system occur despite this reduced dose, then reduce the dose further to 50% of the standard dose.	
Sertindole (Serdolect, Serlect) *SwissMedic Actionable PGx*	i	Sertindole (CYP2D6): Poor Metabolism	In poor metabolizers, Sertindole plasma levels may be two to three times higher than normal.	+

Drug		Finding	Recommendation	Evidence
Antibiotics				
Dapsone (Aczone) *Based on CPIC Guidelines*	✓	Dapsone (G6PD): Normal (Class IV)	Low risk of acute hemolytic anemia. No reason to avoid high risk drugs based on G6PD status.	
Nitrofurantoin (Furadantin) *Based on CPIC Guidelines*	✓	Nitrofurantoin (G6PD): Normal (Class IV)	Low risk of acute hemolytic anemia No reason to avoid medium risk drugs based on G6PD status	

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Drug	Finding	Recommendation	Evidence
Antihypertensives			
Carvedilol (Coreg) *FDA/HCSC Actionable PGx*	Carvedilol (CYP2D6): Poor Metabolism	Results in higher systemic concentrations and higher adverse reaction risk (dizziness)	
Metoprolol (Lopressor) *DPWG*	Metoprolol (CYP2D6): Poor Metabolism	The gene variation reduces the conversion of metoprolol to inactive metabolites. However, the clinical consequences are limited mainly to the occurrence of asymptomatic bradycardia. If a GRADUAL REDUCTION in HEART RATE is desired, or in the event of SYMPTOMATIC BRADYCARDIA: 1. use smaller steps in dose titration and/or prescribe no more than 25% of the standard dose. OTHER CASES: 1. no action required	
Nebivolol (Bystolic) *FDA/SwissMedic Informative PGx*	Nebivolol (CYP2D6): Poor Metabolism	May result in higher systemic concentrations. May require less frequent dosing. Currently no recommendation from the FDA or SwissMedic. No adjustments needed from typical dosing strategies	
Propranolol (Inderal) *FDA/EMA Informative PGx*	Propranolol (CYP2D6): Poor Metabolism	May affect systemic concentrations. Refer to EMA or FDA labeling for specific dosing recommendations and monitor patients for adverse reactions.	
Timolol (Betimol, Blocadren) *EMA Informative PGx*	Timolol (CYP2D6): Poor Metabolism	While the EMA doesn't provide specific pharmacogenetic information on poor CYP2D6 metabolism with Timolol; however, potentiated systemic beta-blockade (e.g., decreased heart rate, depression) has been reported during combined treatment with CYP2D6 inhibitors and timolol. Currently no recommendation from the EMA	

Drug	Finding	Recommendation	Evidence
Antiarrhythmics			
Flecainide (Tambocor) *DPWG*	Flecainide (CYP2D6): Poor Metabolism	The genetic variation reduces conversion of flecainide to inactive metabolites. This increases the risk of side effects. 1. reduce the dose to 50% of the standard dose and record an ECG and monitor the plasma concentration.	

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Drug		Finding	Recommendation	Evidence
Antiarrhythmics				
Propafenone (Rythmol) *DPWG*	⚠	Propafenone (CYP2D6): Poor Metabolism	Genetic variation increases the sum of the plasma concentrations of propafenone and the active metabolite 5-hydroxypropafenone. This increases the risk of side effects. Reduce the dose to 30% of the standard dose, perform an ECG and monitor plasma concentrations.	

Drug		Finding	Recommendation	Evidence
Antithrombotics				
Acenocoumarol (Acenomac, Sintrom, Acitrom) *DPWG*	i	Acenocoumarol Response (VKORC1): Reduced Function	The genetic variation results in a reduction of the required dose, but with the current practice of initiating or reviewing treatment this results in little or no increased risk of bleeding or excessive anticoagulation. NO action is needed for this gene-drug interaction	
Clopidogrel (Plavix) *CPIC*	✓	Clopidogrel - Cardiovascular Indications (CYP2C19): Normal Metabolism	Normal clopidogrel active metabolite formation; normal on-treatment platelet reactivity If considering clopidogrel, use at standard dose (75 mg/day)	
Clopidogrel (Plavix) *CPIC*	✓	Clopidogrel - Neurovascular Indications (CYP2C19): Normal Metabolism	Normal clopidogrel active metabolite formation; normal on-treatment platelet reactivity If considering clopidogrel, use at standard dose (75 mg/day)	
Phenprocoumon (Liquamar) *DPWG*	i	Phenprocoumon Response (VKORC1): Reduced Function	The gene variation leads to a lower dose requirement, but regular monitoring of patients ensures that this does not lead to a distinct increase in the risk of bleeding. NO action is needed for this gene-drug interaction	
Prasugrel (Effient) *FDA/EMA/SwissMedic Informative PGx*	✓	Prasugrel (CYP2C19): Normal Metabolism	There is no relevant effect from variation of CYP2C19 and Prasugrel. No adjustments needed from typical dosing strategies	
Ticagrelor (Brilinta) *EMA Actionable PGx*	✓	Ticagrelor (CYP2C19): Normal Metabolism	Normal Metabolism. No adjustments needed from typical dosing strategies	

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Drug	Finding	Recommendation	Evidence
Antithrombotics			
Ticagrelor (Brilinta)	Ticagrelor (CYP3A4): Normal Metabolism	In the available research, no interaction between genotype and metabolism has been shown. However, this medication has been found to respond to CYP3A4/CYP3A5 inhibitors and inducer. Be cautious when combining use with medications which affect CYP3A metabolism such as ketoconazole.	
Warfarin sodium (Coumadin) *CPIC*	Warfarin (CYP4F2): *1/*3	Altered Function; CPIC recommends a 5% increase in warfarin dosing in patients of non-African ancestry	
Warfarin sodium (Coumadin) *DPWG*	Warfarin (CYP2C9): Intermediate Metabolism	Genetic variation may lead to a decrease in the required maintenance dose. However, there is insufficient evidence that this causes problems when therapy is initiated as usual. NO action is required for this gene-drug interaction.	
Warfarin sodium (Coumadin) *DPWG*	Warfarin Dosing (VKORC1): Reduced Function	The genetic variation results in a reduction in the required dose and an increase in the risk of excessively severe inhibition of blood clotting during the first month of the treatment. However, the effect is small and GA is also the most common genotype, meaning that the standard treatment will primarily be based on patients with this genotype. NO action is needed for this gene-drug interaction	

Drug	Finding	Recommendation	Evidence
Analgesics			
Alfentanil (Rapifen, Alfenta) *CPIC (Dec 2020)*	Alfentanil (OPRM1): Homozygous Variant	Evidence suggests a mild association between OPRM1 and opioid dosing; however, the association is so small that CPIC suggests it is not clinically actionable	
Aspirin; Caffeine; Dihydrocodeine Bitartrate (Synalgos-DC) *FDA Actionable PGx*	Dihydrocodeine (CYP2D6): Poor Metabolism	Currently no recommendation from the FDA. No adjustments needed from typical dosing strategies	

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Drug	Finding	Recommendation	Evidence
Analgesics			
Buprenorphine (Butrans, Buprenex)	Buprenorphine (CYP3A4): Normal Metabolism	In the available research, no interaction between genotype and metabolism has been shown. However, this medication has been found to respond to CYP3A4/CYP3A5 inhibitors and inducer. Be cautious when combining use with medications which affect CYP3A metabolism such as ketoconazole.	
Codeine *CPIC; Swissmedic requires testing*	Codeine (CYP2D6): Poor Metabolism	Greatly reduced morphine formation leading to diminished analgesia Avoid codeine use because of possibility of diminished analgesia. If opioid use is warranted, consider a non-tramadol opioid.	
Fentanyl (Duragesic-100, Duragesic, Sublimaze) *CPIC (Dec 2020)*	Fentanyl (OPRM1): Homozygous Variant	Evidence suggests a mild association between OPRM1 and opioid dosing; however, the association is so small that CPIC suggests it is not clinically actionable	
Fentanyl (Duragesic-100, Duragesic, Sublimaze)	Fentanyl (CYP3A4): Normal Metabolism	In the available research, no interaction between genotype and metabolism has been shown. However, this medication has been found to respond to CYP3A4/CYP3A5 inhibitors and inducer. Be cautious when combining use with medications which affect CYP3A metabolism such as ketoconazole.	
Hydrocodone *CPIC*	Hydrocodone (CYP2D6): Poor Metabolism	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. Use hydrocodone label recommended age- or weight-specific dosing. If no response and opioid use is warranted, consider non-codeine or non-tramadol opioid	
Hydromorphone (Dilaudid-HP, Dilaudid) *CPIC (Dec 2020)*	Hydromorphone (OPRM1): Homozygous Variant	Evidence suggests a mild association between OPRM1 and opioid dosing; however, the association is so small that CPIC suggests it is not clinically actionable	
Methadone (Dolophine, Methadose)	Methadone (CYP2B6): Intermediate Metabolism	There are currently no guidelines or recommendations regarding methadone by CPIC or other international organizations. Although there is existing research and suggested guidelines are pending.	

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Drug	Finding	Recommendation	Evidence
Analgesics			
Morphine (Duramorph PF, MS-IR) *CPIC (Dec 2020)*	Morphine (OPRM1): Homozygous Variant	Evidence suggests a mild association between OPRM1 and opioid dosing; however, the association is so small that CPIC suggests it is not clinically actionable	
Oliceridine (Olinvyk) *FDA Actionable PGx*	Oliceridine (CYP2D6): Poor Metabolism	Results in higher systemic concentrations and higher adverse reaction risk (respiratory depression and sedation). May require less frequent dosing.	
Oxycodone (Oxycontin)	Oxycodone (CYP3A4): Normal Metabolism	In the available research, no interaction between genotype and metabolism has been shown. However, this medication has been found to respond to CYP3A4/CYP3A5 inhibitors and inducer. Be cautious when combining use with medications which affect CYP3A metabolism such as ketoconazole.	
Oxycodone (Oxycontin) *SwissMedic Actionable PGx*	Oxycodone (CYP2D6): Poor Metabolism	May alter the efficacy of oxycodone or lead to undesired effects (weaker analgesic effect)	
Oxycodone (Oxycontin)	Oxycodone (CYP3A5): Poor Metabolism	In the available research, no interaction between genotype and metabolism has been shown. However, this medication has been found to respond to CYP3A4/CYP3A5 inhibitors and inducer. Be cautious when combining use with medications which affect CYP3A metabolism such as ketoconazole.	
Sufentanil (Dsuvia, Sufenta, Zalviso)	Sufentanil (CYP3A4): Normal Metabolism	In the available research, no interaction between genotype and metabolism has been shown. However, this medication has been found to respond to CYP3A4/CYP3A5 inhibitors and inducer. Be cautious when combining use with medications which affect CYP3A metabolism such as ketoconazole.	
Tramadol (Ultracet, Ultram) *CPIC*	Tramadol (CYP2D6): Poor Metabolism	Greatly reduced O-desmethyltramadol (active metabolite) formation leading to diminished analgesia Avoid tramadol use because of possibility of diminished analgesia. If opioid use is warranted, consider a non-codeine opioid.	

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Drug	Finding	Recommendation	Evidence
NSAIDs			
Celecoxib (Celebrex) *CPIC*	Celecoxib (CYP2C9): Intermediate Metabolism	Mildly reduced metabolism Initiate therapy with recommended starting dose. In accordance with the prescribing information, use the lowest effective dosage for shortest duration consistent with individual patient treatment goals.	
Diclofenac (Cataflam) *CPIC (Mar 2020)*	Diclofenac (CYP2C9): Intermediate Metabolism	CPIC suggests diclofenac is not significantly impacted by CYP2C9 genetic variants. There is insufficient evidence to provide a recommendation. NO action is needed for this gene-drug interaction.	
Flurbiprofen (Ansaid) *CPIC*	Flurbiprofen (CYP2C9): Intermediate Metabolism	Mildly reduced metabolism Initiate therapy with recommended starting dose. In accordance with the prescribing information, use the lowest effective dosage for shortest duration consistent with individual patient treatment goals.	
Ibuprofen (Motrin, Advil) *CPIC*	Ibuprofen (CYP2C9): Intermediate Metabolism	Mildly reduced metabolism Initiate therapy with recommended starting dose. In accordance with the prescribing information, use the lowest effective dosage for shortest duration consistent with individual patient treatment goals.	
Lornoxicam (Xefo) *CPIC*	Lornoxicam (CYP2C9): Intermediate Metabolism	Mildly reduced metabolism Initiate therapy with recommended starting dose. In accordance with the prescribing information, use the lowest effective dosage for shortest duration consistent with individual patient treatment goals.	
Meloxicam (Mobic) *CPIC*	Meloxicam (CYP2C9): Intermediate Metabolism	Mildly reduced metabolism Initiate therapy with recommended starting dose. In accordance with the prescribing information, use the lowest effective dosage for shortest duration consistent with individual patient treatment goals	
Piroxicam (Feldene) *CPIC*	Piroxicam (CYP2C9): Intermediate Metabolism	Mildly reduced metabolism Initiate therapy with recommended starting dose. In accordance with the prescribing information, use the lowest effective dosage for shortest duration consistent with individual patient treatment goals.	

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Drug	Finding	Recommendation	Evidence
NSAIDs			
Tenoxicam (Mobiflex) *CPIC*	Tenoxicam (CYP2C9): Intermediate Metabolism	Mildly reduced metabolism. Initiate therapy with recommended starting dose. In accordance with the prescribing information, use the lowest effective dosage for shortest duration consistent with individual patient treatment goals.	
Drug	**Finding**	**Recommendation**	**Evidence**
ADHD Stimulants			
Amphetamine (Adzenys ER, Adzenys, Evekeo)	Amphetamine (COMT): Indeterminate		
Amphetamine (Adzenys ER, Adzenys, Evekeo) *FDA Informative PGx*	Amphetamine (CYP2D6): Poor Metabolism	May affect systemic concentrations and adverse reaction risk. Consider lower starting dosage or use alternative agent.	
Dexmethylphenidate (Focalin)	Dexmethylphenidate (COMT): Indeterminate		
Dextroamphetamine (Zenzedi, Dexedrine)	Dextroamphetamine (COMT): Indeterminate		
Dextroamphetamine (Zenzedi, Dexedrine) *FDA Informative PGx*	Dextroamphetamine (CYP2D6): Poor Metabolism	May affect systemic concentrations and adverse reaction risk. Consider lower starting dosage or use alternative agent.	
Lisdexamfetamine (Vyvanse)	Lisdexamfetamine (COMT): Indeterminate		
Lisdexamfetamine (Vyvanse) *FDA Informative PGx*	Lisdexamfetamine (CYP2D6): Poor Metabolism	May affect systemic concentrations and adverse reaction risk. Consider lower starting dosage or use alternative agent.	
Methylphenidate (Daytrana, Ritalin, Concerta, Metadate)	Methylphenidate (COMT): Indeterminate		

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Drug	Finding	Recommendation	Evidence
ADHD non-stimulants			
Atomoxetine (Strattera) *CPIC*	Atomoxetine (CYP2D6): Poor Metabolism	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 to non-poor metabolizers in those who tolerate treatment. Poor metabolizer status is associated with lower final dose requirements as compared to non-poor metabolizers. Initiate with a dose of 0.5 mg/kg/day and if no clinical response and in the absence of adverse events after 2 weeks, consider obtaining a plasma concentration 4 h after dosing. If response is inadequate and 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.	
Viloxazine (Qelbree) *FDA Actionable PGx*	Viloxazine (CYP2D6): Poor Metabolism	May result in higher systemic concentrations and higher adverse reaction risk. Refer to FDA labeling for specific dosing recommendations and monitor patients for adverse reactions.	
Drug	**Finding**	**Recommendation**	**Evidence**
Statins			
Atorvastatin (Lipitor, Caduet) *CPIC*	Atorvastatin Uptake (SLCO1B1): Normal Function	Typical myopathy risk and statin exposure Prescribe desired starting dose and adjust doses based on disease-specific guidelines.	
Atorvastatin (Lipitor, Caduet)	Atorvastatin (CYP3A4): Normal Metabolism	In the available research, no interaction between genotype and metabolism has been shown. However, this medication has been found to respond to CYP3A4/CYP3A5 inhibitors and inducer. Be cautious when combining use with medications which affect CYP3A metabolism such as ketoconazole.	
Atorvastatin (Lipitor, Caduet) *SwissMedic Actionable PGx*	Atorvastatin Uptake (SLCO1B1 T521C): Typical	Typical; no adjustments needed from typical dosing strategies	

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Drug		Finding	Recommendation	Evidence
Statins				
Fluvastatin (Lescol) *CPIC*	⚠	Fluvastatin (CYP2C9): Intermediate Metabolism	Increased fluvastatin exposure as compared to normal metabolizer which may translate to increased myopathy risk. CPIC recommends prescribing ≤40mg per day as a starting dose and adjust doses of fluvastatin based on disease-specific guidelines. If dose >40mg needed for desired efficacy, consider an alternative statin or combination therapy (i.e., fluvastatin plus non-statin guideline directed medical therapy).	■■
Fluvastatin (Lescol) *CPIC*	✓	Fluvastatin Uptake (SLCO1B1): Normal Function	Typical myopathy risk and statin exposure Prescribe desired starting dose and adjust doses based on disease-specific guidelines.	■
Lovastatin (Mevacor, Altocor) *CPIC (Feb 2022)*	✓	Lovastatin (SLCO1B1): Normal Function	Typical myopathy risk and statin exposure. Prescribe desired starting dose and adjust doses based on disease-specific guidelines.	■
Pitavastatin (Livazo, Livalo) *CPIC/SwissMedic*	✓	Pitavastatin Uptake (SLCO1B1): Normal Function	Typical myopathy risk and statin exposure Prescribe desired starting dose and adjust doses based on disease-specific guidelines.	■
Pravastatin (Pravachol, Selektine)	✓	Pravastatin (KIF6): AG/GG (WIldtype)	There is weak evidence for a gene-drug interaction between KIF6 and Pravastatin; however, some studies have show a increased benefit from pravastatin with this result	⊞
Pravastatin (Pravachol, Selektine) *CPIC*	✓	Pravastatin Uptake (SLCO1B1): Normal Function	Typical myopathy risk and statin exposure Prescribe desired starting dose and adjust doses based on disease-specific guidelines.	■
Rosuvastatin (Rosulip, Crestor, Zuvamor) *CPIC*	✓	Rosuvastatin Uptake (SLCO1B1): Normal Function	Typical myopathy risk and statin exposure Prescribe desired starting dose and adjust doses based on disease-specific guidelines.	■
Simvastatin (Zocor) *CPIC/DPWG*	✓	Simvastatin Uptake (SLCO1B1): Normal Function	Typical myopathy risk and statin exposure Prescribe desired starting dose and adjust doses based on disease-specific guidelines.	■
Drug		**Finding**	**Recommendation**	**Evidence**
Antifungals				

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Drug	Finding	Recommendation	Evidence
Antifungals			
Flucytosine (Ancobon, Ancotil, Cytoflu) *DPWG (Aug 2020)*	Flucytosine (DPYD): Poor Metabolism	A risk of life-threatening toxicity is increased by gene variation. A small proportion of flucytosine is converted to fluorouracil and patients with this gene variation are intolerant even to small quantities of fluorouracil. Avoid flucytosine	
Ketoconazole (Nizoral)	Ketoconazole (CYP3A4): Normal Metabolism	Voriconazole is metabolised by, and inhibits the activity of, cytochrome P450 isoenzymes, CYP2C19, CYP2C9, and CYP3A4. Inhibitors or inducers of these isoenzymes may increase or decrease voriconazole plasma concentrations, respectively, and there is potential for voriconazole to increase the plasma concentrations of substances metabolised by these CYP450 isoenzymes.	
Voriconazole (Vfend) *CPIC*	Voriconazole (CYP2C19): Normal Metabolism	Normal Metabolism. No adjustments needed from typical dosing strategies	
Drug	**Finding**	**Recommendation**	**Evidence**
Anxiolytics			
Alprazolam (Xanax,Niravam)	Alprazolam (CYP3A4): Normal Metabolism	In the available research, no interaction between genotype and metabolism has been shown. However, this medication has been found to respond to CYP3A4/CYP3A5 inhibitors and inducer. Be cautious when combining use with medications which affect CYP3A metabolism such as ketoconazole.	
Buspirone (Buspar)	Buspirone (CYP3A4): Normal Metabolism	In the available research, no interaction between genotype and metabolism has been shown. However, this medication has been found to respond to CYP3A4/CYP3A5 inhibitors and inducer. Be cautious when combining use with medications which affect CYP3A metabolism such as ketoconazole.	
Clobazam (Onfi) *FDA Actionable PGx*	Clobazam (CYP2C19): Normal Metabolism	Normal Metabolism. No adjustments needed from typical dosing strategies	

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Drug	Finding	Recommendation	Evidence
Anxiolytics			
Clonazepam (Klonopin)	Clonazepam (CYP3A4): Normal Metabolism	In the available research, no interaction between genotype and metabolism has been shown. However, this medication has been found to respond to CYP3A4/CYP3A5 inhibitors and inducer. Be cautious when combining use with medications which affect CYP3A metabolism such as ketoconazole.	
Diazepam (Valium) *FDA Actionable PGx*	Diazepam (CYP2C19): Normal Metabolism	Normal Metabolism. No adjustments needed from typical dosing strategies	
Lorazepam (Ativan)	Lorazepam (UGT2B15): Normal Metabolism	There is minimal research regarding an interaction between UGT2B15 and Lorazepam. There are no recommendations from any national or international organization. NO action is needed for this gene-drug interaction	
Oxazepam (Serax, Alepam)	Oxazepam (UGT2B15): Normal Metabolism	There is minimal research regarding an interaction between UGT2B15 and Oxazepam. There are no recommendations from any national or international organization. NO action is needed for this gene-drug interaction	

Drug	Finding	Recommendation	Evidence
Immunosuppressants			
Azathioprine (Imuran) *CPIC; FDA - Testing Recommended*	Azathioprine (NUDT15): Normal Metabolism	Normal risk of thiopurine-related leukopenia, neutropenia, myelosuppression Start with normal starting dose (e.g., 2-3 mg/kg/day) and adjust doses of azathioprine based on disease-specific guidelines. Allow 2 weeks to reach steady state after each dose adjustment.	
Azathioprine (Imuran) *CPIC; FDA - Testing Recommended*	Azathioprine (TPMT): Normal Metabolism	Lower concentrations of TGN metabolites, higher meTIMP, this is the "normal" pattern. Normal risk of thiopurine-related leukopenia, neutropenia, myelosuppression. Start with normal starting dose (e.g., 2-3 mg/kg/day) and adjust doses of azathioprine based on disease-specific guidelines. Allow 2 weeks to reach steady state after each dose adjustment.	

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Drug	Finding	Recommendation	Evidence
Immunosuppressants			
Cyclosporine (Restasis, Gengraf, Neoral)	Cyclosporine (CYP3A4): Normal Metabolism	In the available research, no interaction between genotype and metabolism has been shown. However, this medication has been found to respond to CYP3A4/CYP3A5 inhibitors and inducer. Be cautious when combining use with medications which affect CYP3A metabolism such as ketoconazole.	
Mercaptopurine (Purinethol) *CPIC; FDA - Testing Recommended*	Mercaptopurine (NUDT15): Normal Metabolism	Normal risk of thiopurine-related leukopenia, neutropenia, myelosuppression Start with normal starting dose (e.g., 75 mg/m2/day or 1.5 mg/kg/day) and adjust doses of mercaptopurine (and of any other myelosuppressive therapy) without any special emphasis on mercaptopurine compared to other agents. Allow at least 2 weeks to reach steady-state after each dose adjustment.	
Mercaptopurine (Purinethol) *CPIC; FDA - Testing Recommended*	Mercaptopurine (TPMT): Normal Metabolism	Lower concentrations of TGN metabolites, higher meTIMP, this is the "normal" pattern. Normal risk of thiopurine-related leukopenia, neutropenia, myelosuppression. Start with normal starting dose (e.g., 75 mg/m2/day or 1.5 mg/kg/day) and adjust doses of mercaptopurine (and of any other myelosuppressive therapy) without any special emphasis on mercaptopurine compared to other agents. Allow at least 2 weeks to reach steady-state after each dose adjustment.	
Sirolimus (Rapamune) *EMA Informative PGx*	Sirolimus (CYP3A4): Normal Metabolism	Normal Metabolism. No adjustments needed from typical dosing strategies	
Thioguanine (6-TG, Tabloid, Lanvis) *CPIC; FDA - Testing Recommended*	Thioguanine (NUDT15): Normal Metabolism	Normal risk of thiopurine-related leukopenia, neutropenia, myelosuppression Start with normal starting dose (40-60 mg/day). Adjust doses of thioguanine and of other myelosuppressive therapy without any special emphasis on thioguanine. Allow 2 weeks to reach steady-state after each dose adjustment.	
Thioguanine (6-TG, Tabloid, Lanvis) *CPIC; FDA - Testing Recommended*	Thioguanine (TPMT): Normal Metabolism	Lower concentrations of TGN metabolites, but note that TGN after thioguanine are 5-10X higher than TGN after mercaptopurine or azathioprine. Normal risk of thiopurine-related leukopenia, neutropenia, myelosuppression. Start with normal starting dose (e.g. 40-60 mg/m2/day) and adjust doses of thioguanine and of other myelosuppressive therapy without any special emphasis on thioguanine. Allow 2 weeks to reach steady-state after each dose adjustment.	

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Drug	Finding	Recommendation	Evidence
Anticonvulsants			
Brivaracetam (Briviact, Nubriveo, Brivajoy) *FDA Actionable PGx*	Brivaracetam (CYP2C19): Normal Metabolism	Normal Metabolism. No adjustments needed from typical dosing strategies	
Clobazam (Onfi) *FDA Actionable PGx*	Clobazam (CYP2C19): Normal Metabolism	Normal Metabolism. No adjustments needed from typical dosing strategies	
Fosphenytoin (Cerebyx) *(CPIC)*	Fosphenytoin (CYP2C9): Intermediate Metabolism	Slightly reduced phenytoin metabolism; however, this does not appear to translate into increased side effects. No adjustments needed from typical dosing strategies. Subsequent doses should be adjusted according to therapeutic drug monitoring, response and side effects.	
Lacosamide (Vimpat) *EMA/FDA Informative PGx*	Lacosamide (CYP2C19): Normal Metabolism	Normal Metabolism. No adjustments needed from typical dosing strategies	
Phenytoin (Dilantin) *(DPWG)*	Phenytoin (CYP2C9): Intermediate Metabolism	Genetic variation reduces conversion of phenytoin to inactive metabolites. This increases the risk of side effects. 1. The loading dose does not need to be adjusted. 2. For the other doses, use 75% of the standard dose and assess the dose based on effect and serum concentration after 7-10 days. 3. Advise the patient to get in touch if side effects (such as ataxia, nystagmus, slurred speech, sedation or rash) occur.	

Drug	Finding	Recommendation	Evidence
Proton Pump Inhibitors			
Dexlansoprazole (Kapidex, Dexilant) *CPIC*	Dexlansoprazole (CYP2C19): Normal Metabolism	Normal Dexlansoprazole metabolism; may be at increased risk of therapeutic failure compared to CYP2C19 IMs and PMs Initiate standard starting daily dose. Consider increasing dose by 50-100% for the treatment of H. pylori infection and erosive esophagitis. Daily dose may be given in divided doses. Monitor for efficacy.	

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Drug	Finding	Recommendation	Evidence
Proton Pump Inhibitors			
Lansoprazole (Prevacid) *CPIC*	Lansoprazole (CYP2C19): Normal Metabolism	Normal Lansoprazole metabolism; may be at increased risk of therapeutic failure compared to CYP2C19 IMs and PMs Initiate standard starting daily dose. Consider increasing dose by 50-100% for the treatment of H. pylori infection and erosive esophagitis. Daily dose may be given in divided doses. Monitor for efficacy.	
Omeprazole (Prilosec, Zegerid) *CPIC*	Omeprazole (CYP2C19): Normal Metabolism	Normal Omeprazole metabolism; may be at increased risk of therapeutic failure compared to CYP2C19 IMs and PMs Initiate standard starting daily dose. Consider increasing dose by 50-100% for the treatment of H. pylori infection and erosive esophagitis. Daily dose may be given in divided doses. Monitor for efficacy.	
Pantoprazole (Protonix) *CPIC*	Pantoprazole (CYP2C19): Normal Metabolism	Normal Pantoprazole metabolism; may be at increased risk of therapeutic failure compared to CYP2C19 IMs and PMs Initiate standard starting daily dose. Consider increasing dose by 50-100% for the treatment of H. pylori infection and erosive esophagitis. Daily dose may be given in divided doses. Monitor for efficacy.	
Rabeprazole (Aciphex) *FDA/HCSC/SwissMedic*	Rabeprazole (CYP2C19): Normal Metabolism	Currently no recommendation from the FDA or SwissMedic. No adjustments needed from typical dosing strategies	

Drug	Finding	Recommendation	Evidence
Antiemetics			
Dronabinol (Marinol, Syndros, Reduvo, Adversa) *FDA Actionable PGx*	Dronabinol (CYP2C9): Intermediate Metabolism	May result in higher exposure to Dronabinol and a higher adverse reaction risk. Refer to FDA labeling for specific dosing recommendations and monitor patients for adverse reactions.	
Meclizine (Bonine, Antivert) *FDA Actionable PGx*	Meclizine (CYP2D6): Poor Metabolism	Alters systemic concentrations; monitor for adverse reactions and clinical effect.	

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Drug		Finding	Recommendation	Evidence
Antiemetics				
Metoclopramide (Primperan, Reglan) *FDA Actionable PGx*	i	Metoclopramide (CYP2D6): Poor Metabolism	Results in higher systemic concentrations and higher adverse reaction risk. The recommended dosage is lower. Refer to FDA labeling for specific dosing recommendations.	+
Ondansetron (Zofran) *CPIC*	?	Ondansetron (CYP2D6): Poor Metabolism	Very limited data available for CYP2D6 poor metabolizers Insufficient evidence demonstrating clinical impact based on CYP2D6 genotype. Initiate therapy with recommended starting dose. No recommendation	+
Tropisetron (Navoban, Setrovel) *CPIC*	?	Tropisetron (CYP2D6): Poor Metabolism	Very limited data available for CYP2D6 poor metabolizers Insufficient evidence demonstrating clinical impact based on CYP2D6 genotype. Initiate therapy with recommended starting dose. No recommendation	+
Drug		**Finding**	**Recommendation**	**Evidence**
Antineoplastics				
Belinostat (Beleodaq) *FDA Actionable PGx*	✓	Belinostat (UGT1A1): Intermediate Metabolism	This genetic variation (IM) is more common in Western populations than the wild-type (*1/*1). This means that treatment is largely geared to patients with this genetic variation. Adjustment of the treatment is therefore not useful. NO action is needed for this gene-drug interaction.	+
Belzutifan (Welireg) *FDA Actionable PGx*	✓	Belzutifan (CYP2C19): Normal Metabolism	Normal Metabolism. No adjustments needed from typical dosing strategies	■
Cisplatin (Platinol) *CPNDS (Pediatric-specific)*	✓	Cisplatin (TPMT): Normal Metabolism	Typical; No adjustments needed from typical dosing strategies	■
Erdafitinib (Balversa) *FDA Actionable PGx*	✓	Erdafitinib (CYP2C9): Intermediate Metabolism	Currently no recommendations from the FDA. No adjustments needed from typical dosing strategies	
Erlotinib (Tarceva) *EMA Actionable PGx*	✓	Erlotinib (UGT1A1): Intermediate Metabolism	This genetic variation (IM) is more common in Western populations than the wild-type (*1/*1). This means that treatment is largely geared to patients with this genetic variation. Adjustment of the treatment is therefore not useful. NO action is needed for this gene-drug interaction.	+

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Drug		Finding	Recommendation	Evidence
Antineoplastics				
Gefitinib (Iressa) *FDA/EMA/SwissMedic Actionable PGx*	i	Gefitinib (CYP2D6): Poor Metabolism	Results in higher systemic concentrations and higher adverse reaction risk. Monitor for adverse reactions.	+
Irinotecan (Camptosar, Campto, Onivyde) *DPWG (May 2021)*	✓	Irinotecan (UGT1A1): Intermediate Metabolism	This genetic variation (IM) is more common in Western populations than the wild-type (*1/*1). This means that treatment is largely geared to patients with this genetic variation. Adjustment of the treatment is therefore not useful. NO action is needed for this gene-drug interaction.	+
Nilotinib (Tasigna) *FDA/HCSC Actionable PGx*	✓	Nilotinib (UGT1A1): Intermediate Metabolism	This genetic variation (IM) is more common in Western populations than the wild-type (*1/*1). This means that treatment is largely geared to patients with this genetic variation. Adjustment of the treatment is therefore not useful. NO action is needed for this gene-drug interaction.	+
Ospemifene (Osphena, Senshio) *EMA Actionable PGx*	✓	Ospemifene (CYP3A4, CYP2C9): Intermediate Metabolism	Currently no recommendation from the EMA. No adjustments needed from typical dosing strategies	+
Pazopanib (Votrient) *FDA/EMA Actionable PGx*	✓	Pazopanib (UGT1A1): Intermediate Metabolism	This genetic variation (IM) is more common in Western populations than the wild-type (*1/*1). This means that treatment is largely geared to patients with this genetic variation. Adjustment of the treatment is therefore not useful. NO action is needed for this gene-drug interaction.	+

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Drug	Finding	Recommendation	Evidence
Antineoplastics			
Tamoxifen (Nolvadex, Soltamox) *CPIC; HCSC requires testing*	Tamoxifen (CYP2D6): Poor Metabolism	Lower endoxifen concentrations compared to normal metabolizers; higher risk of breast cancer recurrence, event-free and recurrence-free survival compared to normal metabolizers. 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	

Drug	Finding	Recommendation	Evidence
Central Nervous System Agents			
Deutetrabenazine (Austedo) *FDA Actionable PGx*	Deutetrabenazine (CYP2D6): Poor Metabolism	Results in higher adverse reaction risk. Use with caution	
Dextromethorphan Hydrobromide; Quinidine Sulfate (Nuedexta) *FDA recommends testing*	Dextromethorphan/Quinidine (Nuedexta) (CYP2D6): Poor Metabolism	The quinidine component of NUEDEXTA is intended to inhibit CYP2D6 so that higher exposure to dextromethorphan can be achieved compared to when dextromethorphan is given alone. The quinidine component of NUEDEXTA is not expected to contribute to the effectiveness of NUEDEXTA in PMs, but adverse events of the quinidine are still possible. In those patients who may be at risk of significant toxicity due to quinidine, genotyping to determine if they are PMs should be considered prior to making the decision to treat with NUEDEXTA.	
Eszopiclone (Lunesta)	Eszopiclone (CYP3A4): Normal Metabolism	In the available research, no interaction between genotype and metabolism has been shown. However, this medication has been found to respond to CYP3A4/CYP3A5 inhibitors and inducer. Be cautious when combining use with medications which affect CYP3A metabolism such as ketoconazole.	

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Drug	Finding	Recommendation	Evidence
Central Nervous System Agents			
Siponimod (Mayzent) *DPWG; FDA/EMA/HCSC require testing*	Siponimod (CYP2C9): Intermediate Metabolism	The genetic variation can slightly increase the exposure to siponimod. However, the effect is too small to expect any impact on efficacy or adverse effects. NO action is required for this gene-drug interaction.	
Tetrabenazine (Xenazine) *FDA/Swissmedic require testing*	Tetrabenazine (CYP2D6): Poor Metabolism	Results in higher systemic concentrations; exposure will be about 3-9x higher than normal metabolizers. The maximum recommended single dose is 25 mg and should not exceed 50 mg/day.	
Valbenazine (Ingrezza) *FDA Actionable PGx*	Valbenazine (CYP2D6): Poor Metabolism	Results in higher systemic active metabolite concentrations and higher adverse reaction risk (QT prolongation). Dosage reductions may be necessary.	
Drug	**Finding**	**Recommendation**	**Evidence**
Antidiabetics			
Gliclazide (Diamicron, Diaprel, Azukon) *SwissMedic Actionable PGx*	Gliclazide (G6PD): Normal (Class IV)	Currently no recommendation from the EMA. No adjustments needed from typical dosing strategies	
Glimepiride (Amaryl) *FDA/EMA/HCSC/Swiss Medic Actionable PGx*	Glimepiride (G6PD): Normal (Class IV)	Currently no recommendation from the FDA/EMA. No adjustments needed from typical dosing strategies	
Glipizide (Glucotrol) *FDA Actionable PGx*	Glipizide (G6PD): Normal (Class IV)	Currently no recommendation from the FDA. No adjustments needed from typical dosing strategies	
Glyburide (Micronase, Glibenclamide) *EMA/FDA/HSCS/Swiss Medic Actionable PGx*	Glyburide/Glibenclamide (G6PD): Normal (Class IV)	Currently no recommendation from the FDA/EMA. No adjustments needed from typical dosing strategies	
Metformin (Glucophage)	Metformin (ATM): Homozygous Variant	Studies suggest ATM is not associated with metformin response. NO action is needed for this gene-drug interaction.	

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Drug	Finding	Recommendation	Evidence
Antidiabetics			
Nateglinide (Starlix) *FDA Actionable PGx*	Nateglinide (CYP2C9): Intermediate Metabolism	Typical Function; inhibitors of CYP2C9 (e.g., amiodarone, fluconazole, voriconazole, sulfinpyrazone) may Increase the blood-glucose-lowering Effect of STARLIX and Susceptibility to Hypoglycemia. Dose reductions and increased frequency of glucose monitoring may be required when STARLIX is coadministered with these drugs.	
Saxagliptin (Onglyza)	Saxagliptin (CYP3A4): Normal Metabolism	In the available research, no interaction between genotype and metabolism has been shown. However, this medication has been found to respond to CYP3A4/CYP3A5 inhibitors and inducer. Be cautious when combining use with medications which affect CYP3A metabolism such as ketoconazole.	
Tolbutamide (Orinase) *FDA/HCSC Actionable PGx*	Tolbutamide (G6PD): Normal (Class IV)	Currently no recommendation from the FDA/EMA. No adjustments needed from typical dosing strategies	

Drug	Finding	Recommendation	Evidence
Genitourinary Agents			
Darifenacin (Enablex) *EMA/FDA/HCSC/Swiss Medic Actionable PGx*	Darifenacin (CYP2D6): Poor Metabolism	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).	
Fesoterodine (Toviaz) *FDA Actionable PGx*	Fesoterodine (CYP2D6): Poor Metabolism	Results in higher systemic active metabolite concentrations. (1.7x higher Cmax and 2x higher AUC compared to normal metabolism)	
Mirabegron (Myrbetriq) *FDA Actionable PGx*	Mirabegron (CYP2D6): Poor Metabolism	Results in higher systemic concentrations (16-17% higher Cmax and AUCtau compared to normal metabolism)	
Tamsulosin (Flomax) *FDA Actionable PGx*	Tamsulosin (CYP2D6): Poor Metabolism	Results in higher systemic concentrations. Predicted effect based on experience with CYP2D6 inhibitors. Use with caution.	
Tolterodine (Detrol) *FDA Actionable PGx*	Tolterodine (CYP2D6): Poor Metabolism	Results in higher systemic concentrations and higher adverse reaction risk (QT prolongation).	

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Drug	Finding	Recommendation	Evidence
Additional Medications			
Abrocitinib (Cibinqo) *FDA Actionable PGx*	Abrocitinib (CYP2C19): Normal Metabolism	Normal Metabolism. No adjustments needed from typical dosing strategies	
Atazanavir (Reyataz, Evotaz) *CPIC*	Atazanavir (UGT1A1): Intermediate Metabolism	Somewhat decreased UGT1A1 activity; low likelihood of bilirubin-related discontinuation of atazanavir. 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	
Avatrombopag (Doptelet) *FDA Actionable PGx*	Avatrombopag (F2): Heterozygous Risk	Consider the potential increased thrombotic risk when administering Lusutrombopag to patients with known risk factors for thromboembolism, including genetic pro-thrombotic conditions such as Factor V Leiden (F5) or Prothrombin 20210A (F2). In patients with ongoing or prior thrombosis or absence of hepatopetal blood flow, Lusutrombopag should only be used if the potential benefit to the patient justifies the potential risk.	
Avatrombopag (Doptelet) *EMA/FDA Actionable PGx*	Avatrombopag (CYP2C9): Intermediate Metabolism	Results in higher systemic active metabolite concentrations. Refer to FDA or EMA labeling for specific dosing recommendations.	
Avatrombopag (Doptelet) *FDA Actionable PGx*	Avatrombopag (F5): Typical	Currently no recommendation from the FDA. No adjustments needed from typical dosing strategies	
Carisoprodol (Soma) *FDA Actionable PGx*	Carisoprodol (CYP2C19): Normal Metabolism	Normal Metabolism. No adjustments needed from typical dosing strategies	
Cevimeline (Evoxac) *FDA Actionable PGx*	Cevimeline (CYP2D6): Poor Metabolism	May result in higher adverse reaction risk. Use with caution	
Dextromethorphan (Delsym) *FDA Informative PGx*	Dextromethorphan (CYP2B6): Intermediate Metabolism	Currently no recommendation from the FDA. No adjustments needed from typical dosing strategies	
Dextromethorphan (Delsym) *SwissMedic Actionable PGx*	Dextromethorphan (CYP2D6): Poor Metabolism	May result in significantly delayed metabolism and elimination of dextromethorphan. Currently no recommendations from SwissMedic	

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Drug		Finding	Recommendation	Evidence
Additional Medications				
Dolutegravir (Tivicay, Tivicay PD) *FDA/EMA Actionable PGx*	✓	Dolutegravir (UGT1A1): Intermediate Metabolism	This genetic variation (IM) is more common in Western populations than the wild-type (*1/*1). This means that treatment is largely geared to patients with this genetic variation. Adjustment of the treatment is therefore not useful. NO action is needed for this gene-drug interaction.	⊞
Donepezil (Aricept) *FDA Actionable PGx*	i	Donepezil (CYP2D6): Poor Metabolism	Alters systemic concentrations. (31% slower clearance); currently no recommendations from the FDA	⊞
Efavirenz (Sustiva) *CPIC; FDA/EMA/HCSC/Swiss Medic Actionable PGx*	i	Efavirenz (CYB2B6): Intermediate Metabolism	Higher dose-adjusted trough concentrations of efavirenz compared with normal metabolizers; increased risk of CNS adverse events. Consider initiating efavirenz with decreased dose of 400 mg/day	■■
Elagolix (Orilissa) *FDA Actionable PGx*	✓	Elagolix Uptake (SLCO1B1 T521C): Typical	Typical; no adjustments needed from typical dosing strategies	■
Eliglustat (Cerdelga) *DPWG; FDA/EMA/PMDA require testing*	−	Eliglustat (CYP2D6): Poor Metabolism	This gene variation reduces the conversion of eliglustat to inactive metabolites. This increases the risk of side effects, such as a (small, dose-dependent) elongation of the QT interval. CYP3A inhibitors increase this risk even further. - Co-medication with a STRONG CYP3A INHIBITOR: Eliglustat is contra-indicated. **Choose an alternative if possible.** In cases of co-medication with a WEAK or MODERATE CYP3A INHIBITOR, Eliglustat is not recommended. **Choose an alternative if possible.** **If an alternative is not an option: Use a dose of 84mg eliglustat 1x daily and be alert to side effects.** - Co-medication with a STRONG CYP3A INDUCER: Eliglustat is not recommended. The plasma concentration may decrease so sharply that a therapeutic effect cannot be achieved. **Choose an alternative if possible.** - NO co-medication with a CYP3A inhibitor or strong CYP3A inducer: **1. Use a dose of 84mg 1x daily.**	■
Eltrombopag (Promacta) *FDA/EMA/HCSC Actionable PGx*	✓	Eltrombopag Metabolism (F5): Typical	Currently no recommendation from international institutions. No adjustments needed from typical dosing strategies	■

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Drug	Finding	Recommendation	Evidence
Additional Medications			
Estrogen-containing Oral Contraceptives *DPWG*	Estrogen-containing Oral contraceptives safety (F5): Typical	NO action is needed for this gene-drug interaction	
Flibanserin (Addyi) *FDA Actionable PGx*	Flibanserin (CYP2C19): Normal Metabolism	Normal Metabolism. No adjustments needed from typical dosing strategies	
Galantamine (Razadyne, Razadyne ER, Nivalin) *FDA Informative PGx*	Galantamine (CYP2D6): Poor Metabolism	Results in higher systemic concentrations (35% higher AUC compared to normal metabolism). Titrate dosage based on tolerability.	
Guanfacine (Tenex, Intuniv)	Guanfacine (CYP3A4): Normal Metabolism	In the available research, no interaction between genotype and metabolism has been shown. However, this medication has been found to respond to CYP3A4/CYP3A5 inhibitors and inducer. Be cautious when combining use with medications which affect CYP3A metabolism such as ketoconazole.	
Lesinurad (Zurampic) *EMA/FDA Actionable PGx*	Lesinurad (CYP2C9): Intermediate Metabolism	Typical Function. ZURAMPIC should be used with caution in patients taking moderate inhibitors of CYP2C9 (eg, fluconazole, amiodarone)	
Lofexidine (Kai Er Ding, Lucemyra, Britlofex) *FDA Actionable PGx*	Lofexidine (CYP2D6): Poor Metabolism	Results in higher systemic concentrations and higher adverse reaction risk. Monitor for orthostatic hypotension and bradycardia.	
Lusutrombopag (Mulpleta) *FDA Actionable PGx*	Lusutrombopag (F2): Heterozygous Risk	Consider the potential increased thrombotic risk when administering Lusutrombopag to patients with known risk factors for thromboembolism, including genetic pro-thrombotic conditions such as Factor V Leiden (F5) or Prothrombin 20210A (F2). In patients with ongoing or prior thrombosis or absence of hepatopetal blood flow, Lusutrombopag should only be used if the potential benefit to the patient justifies the potential risk.	
Lusutrombopag (Mulpleta) *FDA Actionable PGx*	Lusutrombopag (F5): Typical	Currently no recommendation from the FDA. No adjustments needed from typical dosing strategies	

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Drug	Finding	Recommendation	Evidence
Additional Medications			
Mavacamten (Camzyos) *EMA Testing Required*	Mavacamten (CYP2C19): Normal Metabolism	Typical Function. The recommended starting dose is 5 mg orally once daily. The maximum dose is 15 mg once daily. The patient should be assessed for early clinical response by LVOT gradient with Valsalva manoeuvre 4 and 8 weeks after treatment initiation.	
Methylene Blue (Provayblue) *CPIC*	Methylene Blue (G6PD): Normal (Class IV)	Low risk of acute hemolytic anemia. No reason to avoid high risk drugs based on G6PD status.	
Nevirapine (Viramune)	Nevirapine (CYP2B6): Intermediate Metabolism	There are currently no guidelines or recommendations regarding Nevirapine by CPIC or other international organization. NO action is needed for this gene-drug interaction	
Peginterferon alfa-2a (Pegasys) *CPIC (2013)*	Peginterferon alfa-2a (IFNL3): Unfavorable Response	"Approximately 30% chance for SVR after 48 weeks of treatment. Consider implications before initiating PEG-IFN alpha and RBV containing regimens. Approximately 60% chance for SVR after 24-48 weeks of treatment. Approximately 50% of patients are eligible for shortened therapy (24-28 weeks). Consider implications before initiating PEG-IFN and RBV containing regimens."	
Peginterferon alfa-2b (PegIntron, Sylatron, ViraferonPeg) *CPIC (2013)*	Peginterferon alfa-2b (IFNL3): Unfavorable Response	"Approximately 30% chance for SVR after 48 weeks of treatment. Consider implications before initiating PEG-IFN alpha and RBV containing regimens. Approximately 60% chance for SVR after 24-48 weeks of treatment. Approximately 50% of patients are eligible for shortened therapy (24-28 weeks). Consider implications before initiating PEG-IFN and RBV containing regimens."	
Pegloticase (Krystexxa) *CPIC*	Pegloticase (G6PD): Normal (Class IV)	Low risk of acute hemolytic anemia. No reason to avoid high risk drugs based on G6PD status.	
Pitolisant (Wakix) *EMA/FDA/HCSC Actionable PGx*	Pitolisant (CYP2D6): Poor Metabolism	Results in up to 3x higher systemic exposure. Use lowest recommended starting dosage. Refer to FDA, EMA, or HCSC labeling for specific dosing recommendations.	
Primaquine *CPIC*	Primaquine (G6PD): Normal (Class IV)	Low risk of acute hemolytic anemia No reason to avoid primaquine based on G6PD status	

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Drug	Finding	Recommendation	Evidence
Additional Medications			
Ranolazine (Ranexa) *EMA/SwissMedic Actionable PGx*	Ranolazine (CYP2D6): Poor Metabolism	At 500 mg twice daily, subjects lacking CYP2D6 activity (poor metabolisers, PM) had 62% higher AUC than subjects with [typical] CYP2D6 metabolizing capacity. The corresponding difference at the 1000 mg twice-daily dose was 25%. The risk for increased exposure leading to adverse events in these different subgroups is higher in patients lacking CYP2D6 activity	
Rasburicase (Elitek) *CPIC*	Rasburicase (G6PD): Normal (Class IV)	Low risk of acute hemolytic anemia. No reason to avoid high risk drugs based on G6PD status.	
Tacrolimus (Prograf, Hecoria) *CPIC/DPWG*	Tacrolimus (CYP3A5): Poor Metabolism	Higher (“normal”) dose-adjusted trough concentrations of tacrolimus and increased chance of achieving target tacrolimus concentrations CPIC recommends initiating therapy with standard recommended dose. Use therapeutic drug monitoring to guide dose adjustments	
Tafenoquine (Arakoda) *CPIC*	Tafenoquine (G6PD): Normal (Class IV)	Low risk of acute hemolytic anemia. No reason to avoid high risk drugs based on G6PD status.	
Tolperisone (Mydocalm) *SwissMedic Actionable PGx*	Tolperisone (CYP2D6): Poor Metabolism	Since a genetic polymorphism exists for the cytochrome CYP2D6, an accumulation of the parent substance tolperisone and a reduced formation of the hydroxylated metabolite can be expected in the poor metabolisers	
Toluidine Blue (Toluidine Blue) *CPIC*	Toluidine Blue (G6PD): Normal (Class IV)	Low risk of acute hemolytic anemia. No reason to avoid high risk drugs based on G6PD status.	
Vorapaxar (Zontivity)	Vorapaxar (CYP3A4): Normal Metabolism	In the available research, no interaction between genotype and metabolism has been shown. However, this medication has been found to respond to CYP3A4/CYP3A5 inhibitors and inducer. Be cautious when combining use with medications which affect CYP3A metabolism such as ketoconazole.	

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Typical response is expected

Consider alternative therapy

Change recommended

Additional information available

Response is uncertain

Strong

Moderate

Emerging

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PGx Info Card

This card contains an abbreviated genetic summary.
It is not intended as a replacement for the complete GeneAcuity™ report.

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Patient: **Ascend Healthcare**

This card shows information about your genetics that relate to drug metabolism. Show to your doctors before being prescribed new medications.

Pharmacogenomic Summary

12q15	CT	Heterozygous Variant
4q25	WT + Heterozygous Variant	Altered Function
ADH1B T143C	TT	Normal Function
ALDH2 G1510A	GG	Normal Function
ANKK1		WT/WT
ANKK1 G2137A	GG	Normal Function
BDNF C196T	TT	Homozygous Variant
C11orf65	AC	Heterozygous Variant
CACNA1C G5361A	AA	Homozygous variant
CACNA1C G270344A	GG	Normal Function
COMT G472A	AA	Homozygous variant
CYP2B6	*1/*6	Intermediate Metabolism
CYP2C19	*1/*1	Normal Metabolism
CYP2C9	*1/*2	Intermediate Metabolism
CYP2D6	*2/*68+*4;*10/*68+*4	Poor Metabolism
CYP3A4	*1/*1	Normal Metabolism
CYP3A5	*3/*3	Poor Metabolism
CYP4F2	*1/*3	Intermediate Metabolism
F13A1 C103A	CC	Normal Function
F2 G*97A	AG	Heterozygous Variant
F5 C1601T	CC	Normal Function
G6PD	B/B	Normal (Class IV)
GRIK1 C1251+1338A	AA	Homozygous variant
GRIK4 T83-10039C	CC	Homozygous variant
GRIN2B T412-46269A	TT	Normal Function
HLA-A*31:01	AA	WT
HLA-B*57:01	TT	WT
IL6/IL6-AS1 (G>C)	CC	Homozygous Variant
ITGB3 T176C	TT	Normal Function
KIF6 A2155G	GG	Homozygous variant
LP(a)	AG/TT	Altered Function
MTHFR	Reduced Function	60-70% enzyme activity
NUDT15	*1/*1	Normal Metabolism
OPRD1 C227+6066T	CT	Heterozygous variant
OPRK1 T258-5311C	CT	Heterozygous variant
OPRM1 A118G	GG	Altered Function
SLCO1B1		Normal Function
SLCO1B1 T521C	TT	Normal Function
TNF G-308A	GG	Wildtype
TPMT	*1/*1	Normal Metabolism
UGT1A1	*1/*80	Intermediate Metabolism
VKORC1 C-1639T	CT	Reduced Function

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