Rua Equador, 43 – Bloco 3 - Sala 1011
Porto Atlântico Square Business
20220-410 – Rio de Janeiro (RJ)
+55 21 2135 8716

PACIENTE: Jane Doe
DT. NASC.: 01/01/1985
REF.: LCG-XXXXXXXXX

COLETADO: 15/10/2018
RECEBIDO: 06/11/2018
REPORTADO: 30/11/2018

AMOSTRA: Bucal
MÉDICO: Não informado
PRÁTICA: Não informado

SUMÁRIO RÁPIDO

AINES

Celecoxib (CELEBRA®, CELEBREX®) **Diclofenaco** (VOLTAREN®, CATAFLAM®)	⚠ Maior probabilidade de síndrome coronariana aguda.

ANESTÉSICOS GERAIS

Desflurano (SUPRANE®) **Isoflurano** (FORANE®) **Sevoflurano** (SEVORANE®, ULTANE®, SOJOURN®) **Succinilcolina** (ANECTINE®, QUELICIN®)	✔ Considere a dosagem da bula se não houver contraindicações.
Óxido Nitroso (NITRONOX)	⚠ Maiores níveis de homocisteína após anestesia.

ANTIARRÍTICOS

Digoxina (DIGOXINA®, LANOXIN®, DIGITEK®)	⚠ O paciente pode ter aumento do metabolismo e diminuição da concentração sérica.
Propafenona (RITMONORM®, RYTHMOL SR®)	⚠ Reduza a dose em 70%, registre o ECG, monitore a concentração plasmática.
Flecainida (TAMBOCOR ™)	⚠ Reduza a dose em 50%, registre o ECG, monitore a concentração plasmática.

ANTICOAGULANTES

Varfarina (MAREVAN®, COUMADIN®)	⚠ Este paciente também possui variantes VKORC1 que devem ser levadas em considerações ao recomendar a dosagem.

ANTIDEPRESSIVOS

Amitriptilina (TRYPTANOL®, AMYTRYL®, ELAVIL®) **Clomipramina** (ANAFRANIL®) **Desipramina** (NORPRAMIN®) **Doxepina** (SINEQUAN®) **Imipramina** (TOFRANIL ™) **Nortriptilina** (PAMELOR ™) **Trimipramina** (SURMONTIL®)	⚠ Evite o uso de tricíclicos. Se um tricíclico for prescrito, monitore o uso terapêutico do mediamento para ajustar da dose.
Duloxetina (CYMBALTA®) **Sertralina** (ZOLOFT®)	✔ Considere a dosagem da bula se não houver contraindicações.
Citalopram (CIPRAMIL®, PROCIMAX®, CELEXA®) **Escitalopram** (LEXAPRO®)	⊘ Considere medicamento alternativo não metabolizado pelo CYP2C19.
Paroxetina (AROPAX®, PAXIL®, PEXEVA®)	⊘ Considere medicamento alternativo não metabolizado pelo CYP2C19 ou considere a redução da dose.

Venlafaxina (EFFEXOR®)	Considere medicamento alternativo não metabolizado pelo CYP2D6.

ANTIDIABÉTICOS

Repaglinida (PRANDIN®) **Tolbutamida** (ORINASE®)	Considere a dosagem da bula se não houver contraindicações.

ANTIEPILÉTICOS

Ácido Valpróico (DEPAKOTE®, STAVZOR®) **Fenitoína** (HIDANTAL®, DILANTIN®) **Mepenitoína** (MESANTOIN®)	Considere a dosagem da bula se não houver contraindicações.

ANTI-HIPERTENSIVOS

Benazepril (LOTENSIN®) **Imidapril** (TANATRIL®)	Risco de resposta reduzida.
Atenolol (TENORETIC®, TENORMIN®) **Enalapril** (VASOTEC®, EPANED™) **Losartan** (ARADOIS®, COZAAR®, HYZAAR®) **Timolol** (TIMOPTOL®, TIMOPTIC®, ISTALOL®, BETIMOL®) **Verapamil** (COVERA®, CALAN®, VERELAN®)	Considere a dosagem da bula se não houver contraindicações.
Irbesartan (APROVEL®, AVAPRO®)	Risco de eficácia reduzida.
Metoprolol (SELOKEN®, LOPRESSOR®, TOPROL XL®)	Utilize um medicamento alternativo ou considere uma dose reduzida.

ANTIPSICÓTICOS

Haloperidol (HALDOL®)	Reduza a dose em 50% ou escolha um medicamento alternativo.
Olanzapina (ZIPREXA®, ZYPREXA®)	Maior risco de efeitos colaterais. Risco de diminuição da AUC. Risco de maior tempo até a resposta. Risco de resposta reduzida. Risco de ganho de peso.
Clozapina (CLOZARIL®, FAZACLO®)	Risco de aumento do tempo até a resposta. Risco de resposta reduzida. Risco de ganho de peso.
Aripiprazol (ABILIFY®)	Considere reduzir a dosagem máxima.
Risperidona (RESPIDON®, RISPERDAL®)	Selecione um medicamento alternativo ou esteja alerta para eventos adversos.

ANTIVIRAL DE HEPATITE

Peginterferon-alfa (PEGASYS®, PEGINTRON®, SYLATRON®) **Ribavirina** (COPEGUS®, REBETOL®)	Risco de resposta desfavorável.

BENZODIAZEPINAS

Diazepam (VALIUM®)	Considere a dosagem da bula se não houver contraindicações.

CORTICOSTEROIDES

Prednisona (METICORTEN®, DELTASONE®, STERAPRED®)	⚠ O paciente apresenta maior risco de permanecer com esteroides um ano após o transplante cardíaco.

ESTATINAS

Fluvastatina (LESCOL®) **Lovastatina** (ALTOPREV®, MEVACOR®) **Pravastatina** (PRAVACOL®, PRAVACHOL®) **Rosuvastatina** (CRESTOR®)	✔ Considere a dosagem da bula se não houver contraindicações.
Sinvastatina (SINVASTACOR®, ZOCOR®, SIMCOR®)	⚠ Maior risco de mialgia. Aumento do risco de miopatia relacionada à estatina. Risco de depuração reduzida Risco de resposta reduzida.
Atorvastatina (CITALOR®, LIPITOR®)	⚠ Aumento do risco de miopatia relacionada à estatina. Risco de resposta reduzida.

FIBROSE CÍSTICA

Ivacaftor (KALYDECO®)	⊘ Ivacaftor não é recomendado. Escolha um medicamento alternativo.

HIV/AIDS

Efavirenz (STOCRIN®, SUSTIVA®) **Nelfinavir** (VIRACEPT®)	⚠ O paciente pode ter risco de diminuição da contagem de células CD4 e diminuição da resposta virológica.
Nevirapina (NEVIRAX®, VIRAMUNE®)	⚠ O paciente apresenta maior risco de hepatotoxicidade por nevirapina.

IMUNOSSUPRESSORES

Azatioprina (IMURAN®) **Ciclosporina** (SANDIMMUNE®) **Sirolimus** (RAPAMUNE®)	✔ Considere a dosagem da bula se não houver contraindicações.
Tacrolimus (PROGRAF®)	⚠ Menor risco de alcançar a remissão.

INIBIDORES DA BOMBA DE PROTÕES

Lansoprazol (PRAZOL®, PREVACID®) **Omeprazol** (GASTRIUM®, PRILOSEC®) **Pantoprazol** (PANTOZOL®, PROTONIX®)	✔ Considere a dosagem da bula se não houver contraindicações.

INIBIDORES DE AGREGAÇÃO DE PLAQUETAS

Clopidogrel (PLAVIX®)	⚠ Esteja atento ao aumento da inibição plaquetária, diminuição da agregação plaquetária residual e aumento do risco de complicações hemorrágicas.

OPIOIDES

Codeína (TYLEX®) **Hidrocodona** (LORTAB®, VICODIN®) **Oxicodona** (OXYCONTIN®, PERCOCET®) **Tramadol** (TRAMAL®, ULTRAM®)	⊘ Considere analgésicos alternativos, como a morfina ou um não-opiáceo. O paciente possui metabolismo altamente reduzido para analgésicos narcóticos, o que leva a um alívio insuficiente da dor.

QUIMIOTERÁPICOS

Ciclofosfamida (CYTOXAN®) **Cisplatina** (C-PLATIN®, PLATINOL®) **Fluorouracil** (EFUDEX®, CARAC®, FLUOROPLEX®, ADRUCIL®) **Leucovorina** (FUSILEV®) **Mercaptopurina** (PURINETHOL®, PURIXAN®) **Oxaliplatina** (ELOXATIN®) **Paclitaxel** (TAXOL®, ABRAXANE®) **Tegafur** **Tioguanina** (TABLOID®)	✅ Considere a dosagem da bula se não houver contraindicações.
Capecitabina (XELODA®)	⚠️ Maior risco de toxidade.
Metotrexato (RASUVO®, OTREXUP ™, TREXALL ™)	⚠️ Maior risco de doença do enxerto contra o hospedeiro.
Tamoxifeno (NOLVADEX®, SOLTAMOX®)	⛔ Maior risco de recaída. Considere um inibidor de aromatase.

RELAXANTES MUSCULARES

Carisoprodol (TANDRILAX®, SOMA®)	✅ Considere a dosagem da bula se não houver contraindicações.

TDAH

Clonidina (KAPVAY®, CATAPRES®, DURACLON®, NEXICLON ™) **Dextroanfetamina** (DEXEDRINE®, PROCENTRA®, DEXTROSTAT®)	⚠️ Risco de resposta reduzida.
Dexmetilfenidato (FOCALIN®) **Metilfenidato** (RITALINA®, RITALIN®, CONCERTA®, DAYTRANA®, METADATE®)	⚠️ Risco de efeitos adversos. Risco de tolerância reduzida.
Anfetamina (ANFEPRAMONA®, FEMPROPOREX®, ADDERALL®) **Lisdexanfetamina** (VENVANSE®, VYVANSE®)	✅ Considere a dosagem da bula se não houver contraindicações.
Atomoxetina (STRATTERA®)	⚠️ Esteja alerta para efeitos adversos ao medicamento.

TROMBOFILIA

Trombofilia	✅ Paciente não possui as variantes do Fator V de Leinden nem do Fator II (Protombina).

IMPORTANTE

Este Sumário Rápido fornece uma visão geral da previsão de resposta do paciente. Estas informações estão baseadas somente nas informações do genótipo e não compõe o perfil completo do paciente. A detecção ou ausência de variantes genéticas não substitui a necessidade de monitoramento terapêutico. Antes de tomar decisões clínicas ou terapêuticas, médicos devem considerar a informação contida na seção Detalhada (disponível apenas em inglês), assim como prescrições atuais, histórico familiar, sintomas apresentados e outros fatores.

✅ Nenhuma observação negativa baseada no genótipo.

⚠️ Genótipo pode apresentar maior risco ou menor efetividade. Prescreva com precaução.

⛔ Genótipo pode apresentar maior risco ou menor efetividade. Considere outro medicamento.

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PATIENT: Doe, Jane (F)
DOB: 1985-01-01
PATIENT ID:

COLLECTED: 10/15/2018
RECEIVED: 11/06/2018
REPORTED: 11/30/2018

SAMPLE TYPE: Buccal
PHYSICIAN: Not Provided
PRACTICE: Not Provided

ACCESSION: LGE-9290880938

QUICK SUMMARY

ADHD	RESULTS
Amphetamine (ADDERALL®) Lisdexamfetamine (VYVANSE®)	✅ Consider label recommended dosage if no contraindication.
Atomoxetine (STRATTERA®)	⚠️ Be alert to adverse drug events.
Clonidine (KAPVAY®, CATAPRES®, DURACLON®, NEXICLON™) Dextroamphetamine (DEXEDRINE®, PROCENTRA®, DEXTROSTAT®)	⚠️ Risk of reduced response.
Dexmethylphenidate (FOCALIN®) Methylphenidate (RITALIN®, CONCERTA®, DAYTRANA®, METADATE®)	⚠️ Risk of adverse effect. Risk of decreased tolerance.

ANTIARRHYTHMICS	
Digoxin (LANOXIN®, DIGITEK®)	⚠️ Patient may have increased metabolism and decreased serum concentration.
Flecainide (TAMBOCOR™)	⚠️ Reduce dose by 50%, record ECG, monitor plasma concentration.
Propafenone (RYTHMOL SR®)	⚠️ Reduce dose by 70%, record ECG, monitor plasma concentration.

ANTICOAGULANTS	
Warfarin (COUMADIN®)	⚠️ This patient also has VKORC1 variants that could further alter dosing considerations.

ANTIDEPRESSANTS	
Amitriptyline (ELAVIL®) Clomipramine (ANAFRANIL®) Desipramine (NORPRAMIN®) Doxepin (SINEQUAN®) Imipramine (TOFRANIL™) Nortriptyline (PAMELOR™) Trimipramine (SURMONTIL®)	⚠️ Avoid tricyclic use. If a tricyclic is warranted utilize therapeutic drug monitoring to guide dose adjustment.
Citalopram (CELEXA®) Escitalopram (LEXAPRO®)	🚫 Consider alternative drug not metabolized by CYP2C19.
Duloxetine (CYMBALTA®) Sertraline (ZOLOFT®)	✅ Consider label recommended dosage if no contraindication.
Paroxetine (PAXIL®, PEXEVA®)	🚫 Consider alternative drug not metabolized by CYP2D6 or consider reduced dose.
Venlafaxine (EFFEXOR®)	🚫 Consider alternative drug not metabolized by CYP2D6.

ANTIDIABETICS	
Repaglinide (PRANDIN®) Tolbutamide (ORINASE®)	✅ Consider label recommended dosage if no contraindication.

ANTIEPILEPTICS	

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Mephenytoin (MESANTOIN®) Phenytoin (DILANTIN®) Valproic Acid (DEPAKOTE®, STAVZOR®)	✅ Consider label recommended dosage if no contraindication.

ANTIHYPERTENSIVES

Atenolol (TENORMIN®) Enalapril (VASOTEC®, EPANED™) Losartan (COZAAR®, HYZAAR®) Timolol (TIMOPTIC®, ISTALOL®, BETIMOL®) Verapamil (COVERA®, CALAN®, VERELAN®)	✅ Consider label recommended dosage if no contraindication.
Benazepril (LOTENSIN®) Imidapril (TANATRIL®)	⚠ Risk of reduced response.
Irbesartan (AVAPRO®)	⚠ Risk of decreased efficacy.
Metoprolol (LOPRESSOR®, TOPROL XL®)	🚫 Select alternative drug or consider dose reduction.

ANTIPSYCHOTICS

Aripiprazole (ABILIFY®)	⚠ Consider reducing maximum dose.
Clozapine (CLOZARIL®, FAZACLO®)	⚠ Risk of increased time until response. Risk of reduced response. Risk of weight gain.
Haloperidol (HALDOL®)	🚫 Reduce dose by 50% or select alternative drug.
Olanzapine (ZYPREXA®)	⚠ Increased risk of side effect. Risk of decreased AUC. Risk of increased time until response. Risk of reduced response. Risk of weight gain.
Risperidone (RISPERDAL®)	🚫 Select alternative drug or be extra alert to ADEs.

BENZODIAZEPINES

Diazepam (VALIUM®)	✅ Consider label recommended dosage if no contraindication.

CHEMOTHERAPEUTICS

Capecitabine (XELODA®)	⚠ Increased risk of toxicity.
Cisplatin (PLATINOL®) Cyclophosphamide (CYTOXAN®) Fluorouracil (EFUDEX®, CARAC®, FLUOROPLEX®, ADRUCIL®) Leucovorin (FUSILEV®) Mercaptopurine (PURINETHOL®, PURIXAN®) Oxaliplatin (ELOXATIN®) Paclitaxel (ABRAXANE®) Tegafur Thioguanine (TABLOID®)	✅ Consider label recommended dosage if no contraindication.
Methotrexate (RASUVO®, OTREXUP™, TREXALL™)	⚠ Increased risk of Graft vs Host Disease.
Tamoxifen (NOLVADEX®, SOLTAMOX®)	🚫 Increased risk for relapse. Consider aromatase inhibitor.

CORTICOSTEROIDS

Prednisone (DELTASONE®, STERAPRED®)	⚠ Patient may have an increased risk of remaining on steroids 1 year after heart transplantation.

CYSTIC FIBROSIS

Ivacaftor (KALYDECO®)	Ivacaftor is not recommended. Select an alternative drug.

GENERAL ANESTHETICS

Desflurane (SUPRANE®) Isoflurane (FORANE®) Sevoflurane (ULTANE®, SOJOURN®) Succinylcholine (ANECTINE®, QUELICIN®)	Consider label recommended dosage if no contraindication.
Nitrous Oxide (NITRONOX)	Higher homocysteine levels after anesthesia.

HEPATITIS ANTIVIRALS

Peginterferon-alfa (PEGASYS®, PEGINTRON®, SYLATRON®) Ribavirin (COPEGUS®, REBETOL®)	Risk of unfavorable response.

HIV/AIDS

Efavirenz (SUSTIVA®) Nelfinavir (VIRACEPT®)	Patient may have risk of decreased CD4-cell count and decreased virologic response.
Nevirapine (VIRAMUNE®)	Patient may have an increased risk of nevirapine hepatotoxicity.

IMMUNOSUPPRESSANTS

Azathioprine (IMURAN®) Cyclosporine (SANDIMMUNE®) Sirolimus (RAPAMUNE®)	Consider label recommended dosage if no contraindication.
Tacrolimus (PROGRAF®)	Decreased risk of achieving remission.

MUSCLE RELAXANTS

Carisoprodol (SOMA®)	Consider label recommended dosage if no contraindication.

NSAIDS

Celecoxib (CELEBREX®) Diclofenac (VOLTAREN®, CATAFLAM®)	Increased likelihood of acute coronary syndrome.

OPIOIDS

Codeine (TYLENOL® #3) Hydrocodone (LORTAB®, VICODIN®) Oxycodone (OXYCONTIN®, PERCOCET®) Tramadol (ULTRAM®)	Consider alternative analgesics such as morphine or a nonopioid. Patient has greatly reduced metabolism of narcotic analgesics, leading to insufficient pain relief.

PLATELET AGGREGATION INHIBITORS

Clopidogrel (PLAVIX®)	Be alert to increased platelet inhibition, decreased residual platelet aggregation, and increased risk of bleeding complications.

PROTON PUMP INHIBITORS

Lansoprazole (PREVACID®) Omeprazole (PRILOSEC®) Pantoprazole (PROTONIX®)	Consider label recommended dosage if no contraindication.

STATINS

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Atorvastatin (LIPITOR®)	⚠ Increased risk of statin-related myopathy. Risk of reduced response.
Fluvastatin (LESCOL®) Lovastatin (ALTOPREV®, MEVACOR®) Pravastatin (PRAVACHOL®) Rosuvastatin (CRESTOR®)	✓ Consider label recommended dosage if no contraindication.
Simvastatin (ZOCOR®, SIMCOR®)	⚠ Increased risk of myalgia. Increased risk of statin-related myopathy. Risk of reduced clearance. Risk of reduced response.

THROMBOPHILIA

Thrombophilia	✓ Patient is negative for the Factor V Leiden and Factor II Prothrombin variants.

IMPORTANT

This Quick Summary provides a brief overview of the predicted response of the patient. This information is based solely on the genotype information and is not based on a complete patient profile. Detection or absence of variants does not replace the need for therapeutic monitoring. Physicians should consider the information contained in the Details section, as well as consider current prescriptions, family history, presenting symptoms, and other factors before making any clinical or therapeutic decisions.

- ✓ No negative assertions based on genotype.
- ⚠ Genotype may present increased risk or decreased effectiveness; prescribe with caution.
- ⊘ Genotype may present increased risk or decreased effectiveness; select alternative drug.

GENE SUMMARY

GENE	GENOTYPE	PHENOTYPE
CYP2D6	*3/*4	⊘ Poor Metabolizer
CYP2C19	*1/*17	⚠ Rapid Metabolizer
CYP2C9	*1/*1	✓ Extensive (Normal) Metabolizer
CYP3A4	*1/*1	✓ Extensive (Normal) Metabolizer
TPMT	*1/*1	✓ Extensive (Normal) Metabolizer
DPYD	*1/*1	✓ Extensive (Normal) Metabolizer
F2/F5	Negative	✓ Normal Thrombophilia Risk
COMT	VAL/VAL	✓ Normal Stimulant Response

DETAILED INFORMATION

Amitriptyline	CYP2C19 *1/*17	*Rapid metabolizer.*	Evidence ★★★
	The genotype predicts the patient is a CYP2C19 Rapid Metabolizer of Amitriptyline. Patient may have increased metabolism of Amitriptyline when compared to extensive metabolizers. The CPIC Guidelines recommends considering an alternative drug not metabolized by CYP2C19. If a tricyclic is warranted, utilize therapeutic drug monitoring to guide dose adjustments.		
	CYP2D6 *3/*4	*Poor metabolizer.*	Evidence ★★★
	The genotype predicts the patient is a CYP2D6 Poor Metabolizer of Amitriptyline. Patient may have a greatly reduced metabolism of tricyclics to less active compounds when compared to extensive metabolizers. Higher plasma concentrations will increase the probability of side effects. The CPIC Guidelines recommend avoiding tricyclic use due to potential for side effects. Consider alternative drug not metabolized by CYP2D6. If a tricyclic is warranted, consider 50% reduction of recommended starting dose. Utilize therapeutic drug monitoring to guide dose adjustments.		
	ABCB1 rs2235015 C/A (HET)		Evidence ★
	Consider label recommended dosage of Amitriptyline if no contraindication.		
Amphetamine	COMT rs4680 G/G (WT)	*Normal stimulant response.*	Evidence ★★
	The patient has the wild-type genotype (VAL/VAL) and should respond well to increased dopamine levels generated by stimulants. Consider label recommended dosage if no contraindication.		
	OPRM1 rs2281617 C/C (WT)	OPRM1 rs510769 C/T (HET)	Evidence ★
	Patients may have normal Euphoria, Energy and Stimulation scores after amphetamine exposure. Consider label recommended dosage of Amphetamine if no contraindication.		
Aripiprazole	CYP2D6 *3/*4	*Poor metabolizer.*	Evidence ★★★
	The genotype predicts that the patient is a Poor Metabolizer for Aripiprazole. The label has dosing recommendation in patients who are classified as CYP2D6 poor metabolizers (PM): The aripiprazole dose in PM patients should initially be reduced to one-half (50%) of the usual dose and then adjusted to achieve a favorable clinical response. The dose of aripiprazole for PM patients who are administered a strong CYP3A4 inhibitor should be reduced to one-quarter (25%) of the usual dose.		
	DRD2 rs1799732 T/TG (HET)		Evidence ★
	Patients with the heterozygous genotype and Schizophrenia who are treated with antipsychotics 1) may have decreased response 2) may have increased time until response, compared to patients with the homozygous genotype.		
	DRD2 rs6277 G/A (HET)		Evidence ★
	Consider label recommended dosage of Aripiprazole if no contraindication.		
Atenolol	AGT rs699 A/G (HET) CACNA1C rs1051375 G/A (HET) GNB3 rs5443 C/C (WT) LDLR rs688 C/C (WT)	AGT rs5051 C/T (HET) EDN1 rs5370 G/G (WT) GNB3 rs2301339 G/G (WT) NR1H3 rs11039149 A/A (WT)	Evidence ★
	Consider label recommended dosage of Atenolol if no contraindication.		
Atomoxetine	CYP2D6 *3/*4	*Poor metabolizer.*	Evidence ★★
	CYP2D6 metabolizers have higher plasma concentrations of atomoxetine compared with individuals who have two copies of normal activity alleles. The DPWG recommends that poor metabolizers be given the standard dose of atomoxetine, but physicians should be aware of adverse drug events.		

DETAILED INFORMATION

	SLC6A2 rs12708954 C/C (WT) Patients with the wild-type genotype and ADHD who are treated with atomoxetine may have decreased response as compared to patients with the homozygous genotype.	Evidence ★
	SLC6A2 rs3785143 C/C (WT) Consider label recommended dosage of Atomoxetine if no contraindication.	Evidence ★
Atorvastatin	ABCB1 rs1045642 G/G (HOM) Patients with the homozygous genotype who are treated with simvastatin may have a reduced response to treatment (measured by a lower reduction in total cholesterol) and may have a higher risk of developing myalgia than the wild-type genotype.	Evidence ★
	ABCB1 rs2032582 C/C (HOM) ABCG2 rs2231142 G/G (WT) RYR1 rs118192172 C/C (WT) SLCO1B1 rs4149056 T/T (WT) Consider label recommended dosage of Atorvastatin if no contraindication.	Evidence ★
Azathioprine	TPMT *1/*1 *Extensive (normal) metabolizer.* Consider label recommended dosage of Azathioprine if no contraindication.	Evidence ★★★
Benazepril	AGT rs5051 C/T (HET) Patients with the heterozygous genotype and hypertension may have a poorer response to treatment with benazepril as compared to patients with the wild-type genotype.	Evidence ★
Capecitabine	DPYD *1/*1 *Extensive (normal) metabolizer.* Consider label recommended dosage of Capecitabine if no contraindication.	Evidence ★★★
	MTHFR rs1801131 G/G (HOM) Patient may have an increased risk of drug toxicity and decreased survival times when receiving capecitabine-based chemotherapy as compared to patients with the wild-type genotype.	Evidence ★★
	DPYD rs2297595 T/T (WT) *Extensive (normal) metabolizer.* Consider label recommended dosage of Capecitabine if no contraindication.	Evidence ★★
	DPYD rs67376798 T/T (WT) *Extensive (normal) metabolizer.* Consider label recommended dosage of Capecitabine if no contraindication.	Evidence ★
Carisoprodol	CYP2C19 *1/*17 *Rapid metabolizer.* Consider label recommended dosage of Carisoprodol if no contraindication.	Evidence ★★★
Celecoxib	CYP2C9 *1/*1 *Extensive (normal) metabolizer.* Consider label recommended dosage of Celecoxib if no contraindication.	Evidence ★★★
	AGT rs699 A/G (HET) Patients with this genotype may have increased likelihood of acute coronary syndrome when exposed to NSAIDs compared to patients with the homozygous genotype.	Evidence ★
Cisplatin	ABCB1 rs1045642 G/G (HOM) Patients with this genotype may have unfavorable prognosis (increased risk of lymph node metastases and decreased survival rate) when treated with cisplatin in people with Esophageal Neoplasms.	Evidence ★

DETAILED INFORMATION

	TPMT *1/*1	*Extensive (normal) metabolizer.*	Evidence ★
	MTHFR rs1801133 G/G (WT)		
	Consider label recommended dosage of Cisplatin if no contraindication.		
Citalopram	CYP2C19 *1/*17	*Rapid metabolizer.*	Evidence ★★★
	The genotype predicts that the patient is a Rapid Metabolizer of Citalopram. The patient may have increased metabolism when compared to extensive metabolizers. Lower plasma concentrations will increase probability of pharmacotherapy failure. The CPIC Guideline recommends considering an alternative drug not predominantly metabolized by CYP2C19.		
	GRIK4 rs1954787 T/C (HET)		Evidence ★★★
	Consider label recommended dosage of Citalopram if no contraindication.		
	HTR2A rs7997012 A/A (WT)		Evidence ★★
	Consider label recommended dosage of Citalopram if no contraindication.		
	HTR2A rs6313 G/G (WT)		Evidence ★
	Patients with the wild-type genotype and major depression may have increased risk of heart palpitations when treated with citalopram as compared to patients with the homozygous genotype.		
	ABCB1 rs2235015 C/A (HET)		Evidence ★
	Consider label recommended dosage of Citalopram if no contraindication.		
Clomipramine	CYP2C19 *1/*17	*Rapid metabolizer.*	Evidence ★★★
	The genotype predicts the patient is a CYP2C19 Rapid Metabolizer of Clomipramine. Patient may have increased metabolism of Clomipramine when compared to extensive metabolizers. The CPIC Guidelines recommends considering an alternative drug not metabolized by CYP2C19. If a tricyclic is warranted, utilize therapeutic drug monitoring to guide dose adjustments.		
	CYP2D6 *3/*4	*Poor metabolizer.*	Evidence ★★★
	The genotype predicts the patient is a CYP2D6 Poor Metabolizer of Clomipramine. Patient may have a greatly reduced metabolism of tricyclics to less active compounds when compared to extensive metabolizers. Higher plasma concentrations will increase the probability of side effects. The CPIC Guidelines recommend avoiding tricyclic use due to potential for side effects. Consider alternative drug not metabolized by CYP2D6. If a tricyclic is warranted, consider 50% reduction of recommended starting dose. Utilize therapeutic drug monitoring to guide dose adjustments.		
Clonidine	GNB3 rs5443 C/C (WT)		Evidence ★
	Patients with the wild-type genotype have a poorer response to treatment with clonidine as compared to patients with the heterozygous or homozygous genotype.		
Clopidogrel	CYP2C19 *1/*17	*Rapid metabolizer.*	Evidence ★★★
	The patient is a rapid metabolizer of Clopidogrel. The US Food and Drug Administration suggests label-recommended dosage and administration of Clopidogrel. The CPIC Dosing Guidelines report risk of increased platelet inhibition and decreased residual platelet aggregation. Ultrarapid metabolizers may also be associated with an increased risk of bleeding complications.		
	CES1 rs71647871 C/C (WT)		Evidence ★★
	Consider label recommended dosage of Clopidogrel if no contraindication.		

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	CYP1A2 rs762551 C/A (HET) Patient may have decreased on-treatment platelet reactivity when treated with clopidogrel as compared to patients with the wild-type genotype.	Evidence ★
	CYP3A4 rs2242480 C/C (WT) *Extensive (normal) metabolizer.* ABCB1 rs1045642 G/G (HOM) Consider label recommended dosage of Clopidogrel if no contraindication.	Evidence ★
Clozapine	DRD2 rs1799732 T/TG (HET) Patients with the heterozygous genotype and Schizophrenia who are treated with antipsychotics 1) may have decreased response 2) may have increased time until response, compared to patients with the homozygous genotype.	Evidence ★
	DRD2 rs6277 G/A (HET) Patients with the heterozygous genotype may have an increased risk for weight gain when treated with clozapine as compared to patients with the homozygous genotype.	Evidence ★
	MTHFR rs1801131 G/G (HOM) Patients with the homozygous genotype and schizophrenia or schizoaffective disorder may have greater weight gain when treated with clozapine as compared to patients with the GT genotype.	Evidence ★
	HTR1A rs6295 C/G (HET) Patients with the heterozygous genotype and schizophrenia may have a poorer response when treated with clozapine as compared to patients with the homozygous genotype.	Evidence ★
	COMT rs4680 G/G (WT) *Normal stimulant response.* CYP1A2 rs762551 C/A (HET) DRD2 rs1079598 A/A (WT) Consider label recommended dosage of Clozapine if no contraindication.	Evidence ★
Codeine	CYP2D6 *3/*4 *Poor metabolizer.* The genotype predicts that the patient is a Poor Metabolizer for Codeine. Patient may have greatly reduced morphine formation following codeine administration, leading to insufficient pain relief. CPIC Dosing Guidelines recommend avoiding codeine use due to lack of efficacy. Consider alternative analgesics such as morphine or a nonopiod. Consider avoiding tramadol. The Dutch Pharmacogenetics Working Group Guideline suggests selecting an alternative drug (e.g., acetaminophen, NSAID, morphine-not tramadol or oxycodone) or be alert to symptoms of insufficient pain relief. Clinical effect: short-lived discomfort (< 48 hr) without permanent injury: e.g. reduced decrease in resting heart rate; reduction in exercise tachycardia; decreased pain relief from oxycodone; ADE resulting from increased bioavailability of atomoxetine (decreased appetite, insomnia, sleep disturbance etc); neutropenia > 1.5x10^9/l; leucopenia > 3.0x10^9/l; thrombocytopenia > 75x10^9/l; moderate diarrhea not affecting daily activities; reduced glucose increase following oral glucose tolerance test.	Evidence ★★★
Cyclophosphamide	MTHFR rs1801133 G/G (WT) Consider label recommended dosage of Cyclophosphamide if no contraindication.	Evidence ★★
Cyclosporine	CYP3A5 *3/*3 Consider label recommended dosage of Cyclosporine if no contraindication.	Evidence ★★

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	CYP3A4 rs35599367 G/G (WT) ABCB1 rs1045642 G/G (HOM)	*Extensive (normal) metabolizer.*	Evidence ★
	Consider label recommended dosage of Cyclosporine if no contraindication.		
Desflurane	RYR1 rs118192161 C/C (WT) RYR1 rs118192162 A/A (WT) RYR1 rs118192175 C/C (WT) RYR1 rs118192176 G/G (WT) RYR1 rs121918593 G/G (WT) RYR1 rs121918594 G/G (WT) RYR1 rs121918595 C/C (WT)	RYR1 rs121918592 G/G (WT) RYR1 rs118192172 C/C (WT) RYR1 rs118192163 G/G (WT) RYR1 rs118192177 C/C (WT) RYR1 rs28933397 C/C (WT) RYR1 rs118192167 A/A (WT) RYR1 rs118192170 T/T (WT)	Evidence ★
	Consider label recommended dosage of Desflurane if no contraindication.		
Desipramine	CYP2C19 *1/*17	*Rapid metabolizer.*	Evidence ★★★
	The genotype predicts the patient is a CYP2C19 Rapid Metabolizer of Desipramine. Patient may have increased metabolism of Desipramine when compared to extensive metabolizers. The CPIC Guidelines recommends considering an alternative drug not metabolized by CYP2C19. If a tricyclic is warranted, utilize therapeutic drug monitoring to guide dose adjustments.		
	CYP2D6 *3/*4	*Poor metabolizer.*	Evidence ★★★
	The genotype predicts the patient is a CYP2D6 Poor Metabolizer of Desipramine. Patient may have a greatly reduced metabolism of tricyclics to less active compounds when compared to extensive metabolizers. Higher plasma concentrations will increase the probability of side effects. The CPIC Guidelines recommend avoiding tricyclic use due to potential for side effects. Consider alternative drug not metabolized by CYP2D6. If a tricyclic is warranted, consider 50% reduction of recommended starting dose. Utilize therapeutic drug monitoring to guide dose adjustments.		
Dexmethylphenidate	COMT rs4680 G/G (WT)	*Normal stimulant response.*	Evidence ★★
	The patient has the wild-type genotype (VAL/VAL) and should respond well to increased dopamine levels generated by stimulants. Consider label recommended dosage if no contraindication.		
	DRD1 rs4532 C/C (WT)		Evidence ★
	Patients with the wild-type genotype and attention deficit hyperactivity disorder (ADHD) may have an increased severity of social withdrawal or nausea when treated with methylphenidate as compared to patients with the heterozygous or homozygous genotype.		
	DRD3 rs6280 C/T (HET)		Evidence ★
	Patients with the heterozygous genotype and autism spectrum disorders may have a lesser tolerance for methylphenidate treatment as compared to patients with the wild-type genotype.		
	ADRA2A rs1800544 G/C (HET)	CES1 rs71647871 C/C (WT)	Evidence ★
	Consider label recommended dosage of Methylphenidate if no contraindication.		
Dextroamphetamine	COMT rs4680 G/G (WT)	*Normal stimulant response.*	Evidence ★★
	The patient has the wild-type genotype (VAL/VAL) and should respond well to increased dopamine levels generated by stimulants. Consider label recommended dosage if no contraindication.		

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	DRD1 rs4532 C/C (WT) Patients with the wild-type genotype and ADHD may have an increased severity of social withdrawal or nausea when treated with dextroamphetamine as compared to patients with the heterozygous or homozygous genotype.	Evidence ★
Diazepam	CYP2C19 *1/*17 *Rapid metabolizer.* The patient is a rarapid metabolizer of diazepam and should have increased metabolism of diazepam (lower AUC and higher clearance of diazepam) compared to poor metabolizers. The patient should emerge from anesthesia more rapidly than poor metabolizers.	Evidence ★
Diclofenac	CYP2C9 *1/*1 *Extensive (normal) metabolizer.* Consider label recommended dosage of Diclofenac if no contraindication.	Evidence ★★
	AGT rs699 A/G (HET) Patients with this genotype may have increased likelihood of acute coronary syndrome when exposed to NSAIDs compared to patients with the homozygous genotype.	Evidence ★
Digoxin	ABCB1 rs1045642 G/G (HOM) Patients with homozygous rs1045642 genotype may have increased metabolism and decreased serum concentration of digoxin.	Evidence ★★
Doxepin	CYP2C19 *1/*17 *Rapid metabolizer.* The genotype predicts the patient is a CYP2C19 Rapid Metabolizer of Doxepin. Patient may have increased metabolism of Doxepin when compared to extensive metabolizers. The CPIC Guidelines recommends considering an alternative drug not metabolized by CYP2C19. If a tricyclic is warranted, utilize therapeutic drug monitoring to guide dose adjustments.	Evidence ★★★
	CYP2D6 *3/*4 *Poor metabolizer.* The genotype predicts the patient is a CYP2D6 Poor Metabolizer of Doxepin. Patient may have a greatly reduced metabolism of tricyclics to less active compounds when compared to extensive metabolizers. Higher plasma concentrations will increase the probability of side effects. The CPIC Guidelines recommend avoiding tricyclic use due to potential for side effects. Consider alternative drug not metabolized by CYP2D6. If a tricyclic is warranted, consider 50% reduction of recommended starting dose. Utilize therapeutic drug monitoring to guide dose adjustments.	Evidence ★★★
Duloxetine	DRD3 rs963468 G/A (HET) Consider label recommended dosage of Duloxetine if no contraindication.	Evidence ★
Efavirenz	CYP3A5 *3/*3 Consider label recommended dosage of Efavirenz if no contraindication.	Evidence ★★
	ABCB1 rs1045642 G/G (HOM) Patients with the homozygous rs1045642 genotype and HIV who are treated with nelfinavir and efavirenz may have decreased CD4-cell count, decreased virologic response, a decreased, but not absent, risk for toxicity-related failure and may have an increased risk of hepatotoxicity.	Evidence ★
Enalapril	CES1 rs71647871 C/C (WT) Consider label recommended dosage of Enalapril if no contraindication.	Evidence ★

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Escitalopram	CYP2C19 *1/*17	*Rapid metabolizer.*	Evidence ★★★
	The genotype predicts that the patient is a Rapid Metabolizer of Escitalopram. The patient may have increased metabolism when compared to extensive metabolizers. Lower plasma concentrations will increase probability of pharmacotherapy failure. The CPIC Guideline recommends considering an alternative drug not predominantly metabolized by CYP2C19.		
	HTR2C rs6318 C/C (HOM)		Evidence ★
	Male patients with this genotype and neuropathic pain may have increased pain relief when treated with escitalopram as compared to patients with the wild-type genotype.		
	CYP1A2 rs2069526 T/T (WT) CYP1A2 rs4646425 C/C (WT) HTR2A rs9316233 C/C (WT)	CYP1A2 rs4646427 T/T (WT) HTR2A rs6311 C/C (WT)	Evidence ★
	Consider label recommended dosage of Escitalopram if no contraindication.		
Flecainide	CYP2D6 *3/*4	*Poor metabolizer.*	Evidence ★★★
	The genotype predicts that the patient is a Poor Metabolizer for Flecainide. The Dutch Pharmacogentics Working Group Guideline recommends reducing dose by 50%, record ECG, monitor plasma concentration. Minor clinical effect: QTc prolongation (<450 ms female, <470 ms male); INR increase < 4.5; Kinetic effect.		
Fluorouracil	MTHFR rs1801131 G/G (HOM)		Evidence ★★
	Consider label recommended dosage if no contraindication.		
	DPYD rs2297595 T/T (WT) DPYD *1/*1	*Extensive (normal) metabolizer.* *Extensive (normal) metabolizer.*	Evidence ★★
	Consider label recommended dosage of Fluorouracil if no contraindication.		
	ABCB1 rs1045642 G/G (HOM)		Evidence ★
	Patients with this genotype may have unfavorable prognosis (increased risk of lymph node metastases and decreased survival rate) when treated with fluorouracil in people with Esophageal Neoplasms.		
	DPYD rs115232898 T/T (WT) DPYD rs17376848 A/A (WT)	*Extensive (normal) metabolizer.* *Extensive (normal) metabolizer.*	Evidence ★
	Consider label recommended dosage of Fluorouracil if no contraindication.		
Fluvastatin	SLCO1B1 rs11045819 C/A (HET)		Evidence ★
	Patients with this genotype who are treated with fluvastatin may have a greater reduction in LDL-C with fluvastatin as compared to patients with the wild-type genotype.		
	ABCG2 rs2231142 G/G (WT)	RYR1 rs118192172 C/C (WT)	Evidence ★
	Consider label recommended dosage of Fluvastatin if no contraindication.		
Haloperidol	CYP2D6 *3/*4	*Poor metabolizer.*	Evidence ★★★
	The genotype predicts that the patient is a Poor Metabolizer for Haloperidol. The Dutch Pharmacogentics Working Group Guideline recommends reducing dose by 50% or selecting alternative drug (e.g., pimozide, flupenthixol, fluphenazine, quetiapine, olanzapine, clozapine).		
	COMT rs4680 G/G (WT)	*Normal stimulant response.*	Evidence ★
	Consider label recommended dosage of Haloperidol if no contraindication.		

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Hydrocodone	CYP2D6 *3/*4 *Poor metabolizer.* The genotype predicts that the patient is a Poor Metabolizer for Hydrocodone. This may lead to greatly reduced morphine formation following Hydrocodone administration leading to insufficient pain relief. The CPIC codeine guidelines suggest avoiding use of analgesics metabolized by CYP2D6 (such as Codeine, Hydrocodone, Oxycodeine, Tramadol) and consider alternative analgesics such as morphine or a non-opioid.	Evidence ★★★
Imidapril	AGT rs5051 C/T (HET) Patients with the heterozygous genotype and hypertension may have a poorer response to treatment with imidapril as compared to patients with the wild-type genotype.	Evidence ★
Imipramine	CYP2C19 *1/*17 *Rapid metabolizer.* The genotype predicts the patient is a CYP2C19 Rapid Metabolizer of Imipramine. Patient may have increased metabolism of Imipramine when compared to extensive metabolizers. The CPIC Guidelines recommends considering an alternative drug not metabolized by CYP2C19. If a tricyclic is warranted, utilize therapeutic drug monitoring to guide dose adjustments.	Evidence ★★★
	CYP2D6 *3/*4 *Poor metabolizer.* The genotype predicts the patient is a CYP2D6 Poor Metabolizer of Imipramine. Patient may have a greatly reduced metabolism of tricyclics to less active compounds when compared to extensive metabolizers. Higher plasma concentrations will increase the probability of side effects. The CPIC Guidelines recommend avoiding tricyclic use due to potential for side effects. Consider alternative drug not metabolized by CYP2D6. If a tricyclic is warranted, consider 50% reduction of recommended starting dose. Utilize therapeutic drug monitoring to guide dose adjustments.	Evidence ★★★
Irbesartan	AGT rs699 A/G (HET) Patients with the heterozygous genotype who have hypertension and left ventricular hypertrophy may have a smaller decrease in systolic blood pressure when treated with irbesartan as compared to patients with the homozygous genotype. However, no significant results were seen for change in diastolic blood pressure.	Evidence ★
	EDN1 rs5370 G/G (WT) Consider label recommended dosage of Irbesartan if no contraindication.	Evidence ★
Isoflurane	RYR1 rs118192161 C/C (WT) RYR1 rs118192162 A/A (WT) RYR1 rs118192175 C/C (WT) RYR1 rs118192176 G/G (WT) RYR1 rs121918593 G/G (WT) RYR1 rs121918594 G/G (WT) RYR1 rs121918595 C/C (WT) RYR1 rs121918592 G/G (WT) RYR1 rs118192172 C/C (WT) RYR1 rs118192163 G/G (WT) RYR1 rs118192177 C/C (WT) RYR1 rs28933397 C/C (WT) RYR1 rs118192167 A/A (WT) RYR1 rs118192170 T/T (WT) Consider label recommended dosage of Isoflurane if no contraindication.	Evidence ★
Ivacaftor	CFTR The patient may not respond to Ivacaftor treatment. The FDA-approved drug labeling information and CPIC guidelines indicate use of ivacaftor in cystic fibrosis patients with at least one copy of a list of 10 CFTR genetic variants. This patient does not have one of these variants and may have an unknown response to ivacaftor treatment, as response may depend on the presence of other CFTR variants.	Evidence ★★

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Lansoprazole	CYP2C19 *1/*17	*Rapid metabolizer.*	Evidence ★★★
	Consider label recommended dosage of Lansoprazole if no contraindication.		
Leucovorin	MTHFR rs1801131 G/G (HOM)		Evidence ★★
	Consider label recommended dosage if no contraindication.		
Lisdexamfetamine	COMT rs4680 G/G (WT)	*Normal stimulant response.*	Evidence ★★
	The patient has the wild-type genotype (VAL/VAL) and should respond well to increased dopamine levels generated by stimulants. Consider label recommended dosage if no contraindication.		
Losartan	CYP2C9 rs1057910 A/A (WT)	*Extensive (normal) metabolizer.*	Evidence ★
	Consider label recommended dosage of Losartan if no contraindication.		
Lovastatin	CYP3A5 rs776746 C/C (WT)	RYR1 rs118192172 C/C (WT)	Evidence ★
	Consider label recommended dosage of Lovastatin if no contraindication.		
Mephenytoin	CYP2C19 *1/*17	*Rapid metabolizer.*	Evidence ★
	Consider label recommended dosage of Mephenytoin if no contraindication.		
Mercaptopurine	TPMT *1/*1	*Extensive (normal) metabolizer.*	Evidence ★★★
	Consider label recommended dosage of Mercaptopurine if no contraindication.		
	MTHFR rs1801133 G/G (WT)		Evidence ★
	Consider label recommended dosage of Mercaptopurine if no contraindication.		
Methotrexate	ABCB1 rs1045642 G/G (HOM)		Evidence ★★
	Consider label recommended dosage of Methotrexate if no contraindication.		
	MTHFR rs1801133 G/G (WT)		Evidence ★
	Patients with this genotype who undergo hematopoietic cell transplant and are treated with methotrexate may have an increased risk of Graft vs Host disease.		
	SLCO1B1 rs4149056 T/T (WT)	SLCO1B1 rs2306283 A/G (HET)	Evidence ★
	Consider label recommended dosage of Methotrexate if no contraindication.		
Methylphenidate	COMT rs4680 G/G (WT)	*Normal stimulant response.*	Evidence ★★
	The patient has the wild-type genotype (VAL/VAL) and should respond well to increased dopamine levels generated by stimulants. Consider label recommended dosage if no contraindication.		
	DRD1 rs4532 C/C (WT)		Evidence ★
	Patients with the wild-type genotype and attention deficit hyperactivity disorder (ADHD) may have an increased severity of social withdrawal or nausea when treated with methylphenidate as compared to patients with the heterozygous or homozygous genotype.		
	DRD3 rs6280 C/T (HET)		Evidence ★
	Patients with the heterozygous genotype and autism spectrum disorders may have a lesser tolerance for methylphenidate treatment as compared to patients with the wild-type genotype.		
	ADRA2A rs1800544 G/C (HET)	CES1 rs71647871 C/C (WT)	Evidence ★
	Consider label recommended dosage of Methylphenidate if no contraindication.		

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Metoprolol	CYP2D6 *3/*4 *Poor metabolizer.*	Evidence ★★★
	The patient is a CYP2D6 poor metabolizer. Poor metabolizers will have increased (several-fold) metoprolol blood levels, decreasing metoprolol's cardioselectivity. The DPWG Guidelines indicate a risk of heart failure, and recommend selecting an alternative drug (e.g., bisoprolol, carvedilol) or reduce dose by 75% and be alert to ADEs (e.g., bradycardia, cold extremities).	
Nelfinavir	ABCB1 rs1045642 G/G (HOM)	Evidence ★
	Patients with the homozygous rs1045642 genotype and HIV who are treated with nelfinavir and efavirenz may have decreased CD4-cell count, a decreased virologic response, a decreased, but not absent, risk for toxicity-related failure and an increased risk of hepatotoxicity.	
Nevirapine	ABCB1 rs1045642 G/G (HOM)	Evidence ★★
	Patients with the homozygous rs1045642 genotype and HIV-1 infection who are treated with nevirapine may have an increased risk for nevirapine hepatotoxicity.	
	CYP3A5 *3/*3	Evidence ★★
	Patients with the CYP3A5 *3/*3 genotype and HIV infection who are treated with nevirapine may have increased clearance of the drug as compared to patients with the *1/*3 or *1/*1 genotype. Association with clearance was not found in a larger cohort in a separate study. Patients may also have differences in alanine aminotransferase levels, but association with toxicity has not been reported.	
Nitrous Oxide	MTHFR rs1801131 G/G (HOM)	Evidence ★
	Patients with the homozygous rs1801131 genotype may have higher homocysteine levels after nitrous oxide anesthesia.	
	MTHFR rs1801133 G/G (WT)	Evidence ★
	Consider label recommended dosage of Nitrous Oxide if no contraindication.	
Nortriptyline	CYP2C19 *1/*17 *Rapid metabolizer.*	Evidence ★★★
	The genotype predicts the patient is a CYP2C19 Rapid Metabolizer of Nortriptyline. Patient may have increased metabolism of Nortriptyline when compared to extensive metabolizers. The CPIC Guidelines recommends considering an alternative drug not metabolized by CYP2C19. If a tricyclic is warranted, utilize therapeutic drug monitoring to guide dose adjustments.	
	CYP2D6 *3/*4 *Poor metabolizer.*	Evidence ★★★
	The genotype predicts the patient is a CYP2D6 Poor Metabolizer of Nortriptyline. Patient may have a greatly reduced metabolism of tricyclics to less active compounds when compared to extensive metabolizers. Higher plasma concentrations will increase the probability of side effects. The CPIC Guidelines recommend avoiding tricyclic use due to potential for side effects. Consider alternative drug not metabolized by CYP2D6. If a tricyclic is warranted, consider 50% reduction of recommended starting dose. Utilize therapeutic drug monitoring to guide dose adjustments.	
	GNB3 rs5443 C/C (WT)	Evidence ★
	Patients with the wild-type genotype and major depression who are treated with nortriptyline may have less improvement in neurovegetative symptoms and an increased likelihood of Sleep Initiation and Maintenance Disorders. These patients are at decreased risk for weight gain as compared to patients with the homozygous genotype.	
	ABCB1 rs1045642 G/G (HOM)	Evidence ★
	Consider label recommended dosage of Nortriptyline if no contraindication.	

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DETAILED INFORMATION

Olanzapine	HTR2C rs3813929 C/C (WT) Consider label recommended dosage of Olanzapine if no contraindication.	Evidence ★★
	CYP3A5 rs776746 C/C (WT) Individuals with the homozygous genotype may have decreased area under the curve (AUC) of olanzapine as compared to Individuals with the heterozygous or wild-type genotype.	Evidence ★
	DRD2 rs1799732 T/TG (HET) Patients with the heterozygous genotype and Schizophrenia who are treated with antipsychotics 1) may have decreased response 2) may have increased time until response, compared to patients with the homozygous genotype.	Evidence ★
	DRD2 rs6277 G/A (HET) Patients with the heterozygous genotype may have an increased risk for weight gain when treated with olanzapine as compared to patients with the homozygous genotype.	Evidence ★
	DRD3 rs6280 C/T (HET) Patients with the heterozygous genotype and schizophrenia who are treated with olanzapine may have reduced positive symptom improvement and positive symptom remission as compared to patients with the wild-type genotypes.	Evidence ★
	MTHFR rs1801131 G/G (HOM) Patients with the homozygous genotype and schizophrenia or schizoaffective disorder may have greater weight gain when treated with olanzapine as compared to patients with the GT genotype.	Evidence ★
	HTR2A rs7997012 A/A (WT) Patients with the wild-type genotype and psychiatric disorders who are treated with olanzapine may have an increased risk for more side effects as compared to patients with the heterozygous or homozygous genotype.	Evidence ★
	HTR2C rs6318 C/C (HOM) Patients with the wild genotype and schizophrenia, treated with olanzapine, may have an increased likelihood for tendency of olanzapine-induced weight as compared to patients the homozygous genotype. However, contradictory findings are reported.	Evidence ★
	HTR1A rs10042486 C/T (HET) Patients with the heterozygous genotype and schizophrenia may have a poorer response when treated with olanzapine as compared to patients with the homozygous genotype.	Evidence ★
	TPMT rs1142345 T/T (WT) *Extensive (normal) metabolizer.* ABCB1 rs1045642 G/G (HOM) — CYP1A2 rs762551 C/A (HET) DRD2 rs1079598 A/A (WT) — DRD2 rs1799978 T/T (WT) GNB3 rs5443 C/C (WT) — HTR2A rs6313 G/G (WT) HTR2C rs518147 C/C (HOM) — HTR2C rs1414334 C/C (WT) Consider label recommended dosage of Olanzapine if no contraindication.	Evidence ★
Omeprazole	CYP2C19 *1/*17 *Rapid metabolizer.* Consider label recommended dosage of Omeprazole if no contraindication.	Evidence ★★★
Oxaliplatin	MTHFR rs1801131 G/G (HOM) Consider label recommended dosage if no contraindication.	Evidence ★★

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	DPYD rs67376798 T/T (WT)	*Extensive (normal) metabolizer.*	Evidence ★
	Consider label recommended dosage of Oxaliplatin if no contraindication.		
Oxycodone	CYP2D6 *3/*4	*Poor metabolizer.*	Evidence ★★
	The genotype predicts that the patient is a Poor Metabolizer for Oxycodone. Consider using an alternate drug rather than oxycodone (not codeine or tramadol) or be alert to insufficient pain relief. The Dutch Pharmacogenetics Working Group Guideline indicates that there is insufficient data to allow calculation of dose adjustment. Clinical effect: short-lived discomfort (< 48 hr) without permanent injury: e.g. reduced decrease in resting heart rate; reduction in exercise tachycardia; decreased pain relief from oxycodone; ADE resulting from increased bioavailability of atomoxetine (decreased appetite, insomnia, sleep disturbance etc); neutropenia > 1.5x10^9/l; leucopenia > 3.0x10^9/l; thrombocytopenia > 75x10^9/l; moderate diarrhea not affecting daily activities; reduced glucose increase following oral glucose tolerance test.		
Paclitaxel	CYP3A4 rs67666821 G/G (WT)	*Extensive (normal) metabolizer.*	Evidence ★
	CYP3A4 rs72552799 C/C (WT)	*Extensive (normal) metabolizer.*	
	ABCB1 rs1045642 G/G (HOM)	CYP3A5 rs776746 C/C (WT)	
	Consider label recommended dosage of Paclitaxel if no contraindication.		
Pantoprazole	CYP2C19 *1/*17	*Rapid metabolizer.*	Evidence ★★★
	Consider label recommended dosage of Pantoprazole if no contraindication.		
Paroxetine	CYP2D6 *3/*4	*Poor metabolizer.*	Evidence ★★★
	The genotype predicts that the patient is a Poor Metabolizer of Paroxetine. The patient may have greatly reduced metabolism when compared to extensive metabolizers, and higher plasma concentrations may increase the probability of side effects. The CPIC Guideline recommends selecting alternative drug not predominantly metabolized by CYP2D6 or if paroxetine use warranted, consider a 50% reduction of recommended starting dose and titrate to response.		
	HTR1A rs6295 C/G (HET)		Evidence ★★
	Patients with the heterozygous genotype with panic disorder who are treated with paroxetine may have a reduced response at 4 weeks of treatment as compared to patients with the homozygous genotype.		
	CYP1A2 rs2470890 C/T (HET)		Evidence ★
	Patients with the heterozygous genotype and major depressive disorder who are treated with paroxetine may be less likely to experience remission as compared to patients with the wild-type genotype.		
	COMT rs4680 G/G (WT)	*Normal stimulant response.*	Evidence ★
	Patients with this genotype who have major depression may have a decreased response to paroxetine compared to the homozygous genotype.		
	HTR2A rs6313 G/G (WT)		Evidence ★
	Patients with the wild-type genotype and depression who are treated with paroxetine may have an increased risk of adverse drug reactions as compared to patients with the heterozygous or homozygous genotype.		
	HTR1A rs10042486 C/T (HET)		Evidence ★
	Patients with the heterozygous genotype and Major Depressive Disorder who are treated with paroxetine may have decreased response to treatment as compared to patients with the wild-type genotype.		

DETAILED INFORMATION

	CYP1A2 rs762551 C/A (HET) Patients with heterozygous genotype may require an increased dose of paroxetine and may have an increased risk of fatigue when treated with paroxetine as compared to patients with the wild-type genotype.	Evidence ★
	ABCB1 rs2235015 C/A (HET) CYP1A2 rs4646427 T/T (WT) DRD3 rs6280 C/T (HET) Consider label recommended dosage of Paroxetine if no contraindication.	Evidence ★
Peginterferon-alfa	IFNL3 rs12979860 C/T (HET) Patients with the Hepatitis C (genotype 1) virus treated with PEG-IFN alpha and RBV alone have a 30% chance for sustained virologic response after 48 weeks of treatment. If treatment is combined with a protease inhibitor, the patient has an approximately 60% chance for sustained virologic response after 24-48 weeks of treatment.	Evidence ★★★
	IFNL3 rs8099917 T/T (WT) Consider label recommended dosage of Peginterferon-alfa if no contraindication.	Evidence ★★★
	IFNL3 rs8103142 T/C (HET) Patients with this genotype may have decreased response to peginterferon alfa-2a, peginterferon alfa-2b and ribavirin in people with Hepatitis C as compared to patients with wild-type genotype.	Evidence ★
Phenytoin	CYP2C9 *1/*1 *Extensive (normal) metabolizer.* Consider label recommended dosage of Phenytoin if no contraindication.	Evidence ★★★
	ABCB1 rs1045642 G/G (HOM) Patients with the homozygous genotype may have decreased plasma drug levels of phenytoin. However another study reported no association between this variant and increased dose of phenytoin in people with epilepsy. Patients with the homozygous rs1045642 genotype may have increased likelihood of drug resistance when treated with phenytoin in African Americans with epilepsy. However, no association has been found between this variant and increased response to phenytoin in Asians.	Evidence ★
	CYP2C9 rs9332131 A/A (WT) *Extensive (normal) metabolizer.* Consider label recommended dosage of Phenytoin if no contraindication.	Evidence ★
Pravastatin	SLCO1B1 rs4149056 T/T (WT) Consider label recommended dosage of Pravastatin if no contraindication.	Evidence ★★
	ABCB1 rs2032582 C/C (HOM) MTHFR rs1801133 G/G (WT) RYR1 rs118192172 C/C (WT) SLCO1B1 rs4149015 G/G (WT) Consider label recommended dosage of Pravastatin if no contraindication.	Evidence ★
Prednisone	ABCB1 rs1045642 G/G (HOM) Pediatric patients with the homozygous rs1045642 genotype who are treated with prednisone and tacrolimus may have an increased risk of remaining on steroids 1 year after heart transplantation.	Evidence ★

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Propafenone	CYP2D6 *3/*4 *Poor metabolizer.* The genotype predicts that the patient is a Poor Metabolizer for Propafenone. The Dutch Pharmacogentics Working Group Guideline recommends reducing dose by 70%, recording ECG, and monitoring plasma concentration. Clinical effect: long-standing discomfort (48-168 hr) without permanent injury e.g. failure of therapy with tricyclic antidepressants, atypical antipsychotic drugs; extrapyramidal side effects; parkinsonism; ADE resulting from increased bioavailability of tricyclic antidepressants, metoprolol, propafenone (central effects e.g. dizziness); INR 4.5-6.0; neutropenia 1.0-1.5x10^9/l; leucopenia 2.0-3.0x10^9/l; thrombocytopenia 50-75x10^9/l.	Evidence ★★★
Repaglinide	SLCO1B1 rs4149056 T/T (WT) Consider label recommended dosage of Repaglinide if no contraindication.	Evidence ★
Ribavirin	IFNL3 rs12979860 C/T (HET) Patients with the Hepatitis C (genotype 1) virus treated with PEG-IFN alpha and RBV alone have a 30% chance for sustained virologic response after 48 weeks of treatment. If treatment is combined with a protease inhibitor, the patient has an approximately 60% chance for sustained virologic response after 24-48 weeks of treatment.	Evidence ★★★
	IFNL3 rs8099917 T/T (WT) Consider label recommended dosage of Ribavirin if no contraindication.	Evidence ★★★
	IFNL3 rs8103142 T/C (HET) Patients with this genotype may have decreased response to peginterferon alfa-2a, peginterferon alfa-2b and ribavirin in people with Hepatitis C as compared to patients with wild-type genotype.	Evidence ★
Risperidone	CYP2D6 *3/*4 *Poor metabolizer.* The DPWG Pharmacogenetics Working Group has evaluated therapeutic dose recommendations for risperidone based on CYP2D6 genotypes and recommends selecting an alternative drug or being extra alert to Adverse Drug Events and adjusting dose to clinical response for patients who are CYP2D6 poor, intermediate, or ultrarapid metabolizers.	Evidence ★★★
	ABCB1 rs1128503 G/G (HOM) Patients with the homozygous genotype may have poorer response to risperidone in Children with Autism, than patients with heterozygous or wild-type genotype.	Evidence ★
	DRD2 rs1799732 T/TG (HET) Patients with the heterozygous genotype and Schizophrenia who are treated with antipsychotics 1) may have decreased response 2) may have increased time until response, compared to patients with the homozygous genotype.	Evidence ★
	HTR2A rs6311 C/C (WT) Patients with the wild-type genotype may have poorer response to risperidone in children with autism as compared to patients with the heterozygous or homozygous genotype.	Evidence ★
	HTR1A rs10042486 C/T (HET) Patients with the heterozygous genotype and schizophrenia may have a poorer response when treated with risperidone as compared to patients with the homozygous genotype.	Evidence ★

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	DRD3 rs6280 C/T (HET) HTR2A rs6313 G/G (WT)	DRD3 rs167771 A/A (HOM) HTR2C rs3813928 G/G (WT)	Evidence ★
	Consider label recommended dosage of Risperidone if no contraindication.		
Rosuvastatin	ABCG2 rs2231142 G/G (WT)	SLCO1B1 rs4149056 T/T (WT)	Evidence ★★
	Consider label recommended dosage of Rosuvastatin if no contraindication.		
	RYR1 rs118192172 C/C (WT)		Evidence ★
	Consider label recommended dosage of Rosuvastatin if no contraindication.		
Sertraline	CYP2C19 *1/*17 HTR1A rs6295 C/G (HET)	*Rapid metabolizer.*	Evidence ★★★
	Consider label recommended dosage of Sertraline if no contraindication.		
Sevoflurane	RYR1 rs118192161 C/C (WT) RYR1 rs118192162 A/A (WT) RYR1 rs118192175 C/C (WT) RYR1 rs118192176 G/G (WT) RYR1 rs121918593 G/G (WT) RYR1 rs121918594 G/G (WT) RYR1 rs121918595 C/C (WT)	RYR1 rs121918592 G/G (WT) RYR1 rs118192172 C/C (WT) RYR1 rs118192163 G/G (WT) RYR1 rs118192177 C/C (WT) RYR1 rs28933397 C/C (WT) RYR1 rs118192167 A/A (WT) RYR1 rs118192170 T/T (WT)	Evidence ★
	Consider label recommended dosage of Sevoflurane if no contraindication.		
Simvastatin	SLCO1B1 rs4149056 T/T (WT)		Evidence ★★★
	Consider label recommended dosage of Simvastatin if no contraindication.		
	ABCB1 rs2032582 C/C (HOM)		Evidence ★★
	Patients with this genotype who are treated with simvastatin may have a reduced response (as measured by lower reductions in total cholesterol) and an increased risk of developing myalgia.		
	ABCB1 rs1045642 G/G (HOM)		Evidence ★
	Patients with the homozygous genotype who are treated with simvastatin may have a reduced response to treatment (measured by a lower reduction in total cholesterol) and may have a higher risk of developing myalgia than the wild-type genotype.		
	SLCO1B1 rs4149081 G/A (HET)		Evidence ★
	Patients with this genotype and Coronary Disease may have higher LDL-C reduction as compared to patients with the wild-type genotype.		
	CYP3A5 rs776746 C/C (WT)		Evidence ★
	Patients with this genotype may have higher plasma concentrations and reduced clearance of simvastatin as compared to patients with the homozygous genotype. This does not seem to affect response to treatment or risk of myalgia.		
	ABCG2 rs2231142 G/G (WT)	RYR1 rs118192172 C/C (WT)	Evidence ★
	Consider label recommended dosage of Simvastatin if no contraindication.		
Sirolimus	CYP3A5 *3/*3		Evidence ★★
	Consider label recommended dosage of Sirolimus if no contraindication.		
	ABCB1 rs1045642 G/G (HOM)		Evidence ★
	Consider label recommended dosage of Sirolimus if no contraindication.		

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Succinylcholine	RYR1 rs118192161 C/C (WT) RYR1 rs118192162 A/A (WT) RYR1 rs118192175 C/C (WT) RYR1 rs118192176 G/G (WT) RYR1 rs121918593 G/G (WT) RYR1 rs121918594 G/G (WT) RYR1 rs121918595 C/C (WT)	RYR1 rs121918592 G/G (WT) RYR1 rs118192172 C/C (WT) RYR1 rs118192163 G/G (WT) RYR1 rs118192177 C/C (WT) RYR1 rs28933397 C/C (WT) RYR1 rs118192167 A/A (WT) RYR1 rs118192170 T/T (WT)	Evidence ★
	Consider label recommended dosage of Succinylcholine if no contraindication.		
Tacrolimus	CYP3A5 *3/*3		Evidence ★★★
	Consider label recommended dosage of Tacrolimus if no contraindication.		
	ABCB1 rs1045642 G/G (HOM)		Evidence ★
	Patients with this genotype and ulcerative colitis may have a poorer chance at achieving remission when treated with tacrolimus as compared to patients with the wild-type genotype. This genotype is also associated with an increased risk of remaining on steroids 1 year after heart transplantation.		
Tamoxifen	CYP2D6 *3/*4	*Poor metabolizer.*	Evidence ★★★
	Patient is a CYP2D6 Poor Metabolizer. Tamoxifen is a pro-drug requiring metabolic activation by CYP2D6. The DPWG Guidelines warn of an increased risk for relapse of breast cancer. Consider aromatase inhibitor for postmenopausal women.		
Tegafur	DPYD *1/*1	*Extensive (normal) metabolizer.*	Evidence ★★
	Consider label recommended dosage of Tegafur if no contraindication.		
Thioguanine	TPMT *1/*1	*Extensive (normal) metabolizer.*	Evidence ★★★
	Consider label recommended dosage of Thioguanine if no contraindication.		
Thrombophilia	F2 rs1799963 G/G (WT)		Evidence ★★★
	The patient does not carry the Prothrombin (Factor II: G20210A) Mutation, a common genetic marker associated with inherited thrombophilia.		
	F5 rs6025 C/C (HOM)		Evidence ★★★
	The patient does not carry the Factor V Leiden (G1691A) Mutation, a common genetic marker associated with inherited thrombophilia.		
Timolol	ADRB1 rs1801252 A/A (WT)		Evidence ★
	Consider label recommended dosage of Timolol if no contraindication.		
Tolbutamide	CYP2C9 *1/*1	*Extensive (normal) metabolizer.*	Evidence ★★
	Consider label recommended dosage of Tolbutamide if no contraindication.		
Tramadol	CYP2D6 *3/*4	*Poor metabolizer.*	Evidence ★★★
	The genotype predicts that the patient is a Poor Metabolizer for Tramadol. The Dutch Pharmacogentics Working Group Guideline recommends selecting an alternative drug, not oxycodone or codeine, or be alert to symptoms of insufficient pain relief. Clinical effect: short-lived discomfort (< 48 hr) without permanent injury: e.g. reduced decrease in resting heart rate; reduction in exercise tachycardia; decreased pain relief from oxycodone; ADE resulting from increased bioavailability of atomoxetine (decreased appetite, insomnia, sleep disturbance etc); neutropenia > 1.5x10^9/l; leucopenia > 3.0x10^9/l; thrombocytopenia > 75x10^9/l; moderate diarrhea not affecting daily activities; reduced glucose increase following oral glucose tolerance test.		

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Trimipramine	CYP2C19 *1/*17 *Rapid metabolizer.*	Evidence ★★★
	The genotype predicts the patient is a CYP2C19 Rapid Metabolizer of Trimipramine. Patient may have increased metabolism of Trimipramine when compared to extensive metabolizers. The CPIC Guidelines recommends considering an alternative drug not metabolized by CYP2C19. If a tricyclic is warranted, utilize therapeutic drug monitoring to guide dose adjustments.	
	CYP2D6 *3/*4 *Poor metabolizer.*	Evidence ★★★
	The genotype predicts the patient is a CYP2D6 Poor Metabolizer of Trimipramine. Patient may have a greatly reduced metabolism of tricyclics to less active compounds when compared to extensive metabolizers. Higher plasma concentrations will increase the probability of side effects. The CPIC Guidelines recommend avoiding tricyclic use due to potential for side effects. Consider alternative drug not metabolized by CYP2D6. If a tricyclic is warranted, consider 50% reduction of recommended starting dose. Utilize therapeutic drug monitoring to guide dose adjustments.	
Valproic Acid	CYP2C9 *1/*1 *Extensive (normal) metabolizer.*	Evidence ★
	Consider label recommended dosage of Valproic Acid if no contraindication.	
Venlafaxine	CYP2D6 *3/*4 *Poor metabolizer.*	Evidence ★★★
	The genotype predicts that the patient is a Poor Metabolizer of venlafaxine. The Dutch Pharmacogenetics Working Group Guideline indicates that there is insufficient data to allow calculation of dose adjustment, and recommends selecting an alternative drug (e.g., citalopram, sertraline) or adjust dose to clinical response and monitor (O-desmethyl)venlafaxine plasma concentration.	
	COMT rs4680 G/G (WT) *Normal stimulant response.*	Evidence ★
	Patients with this genotype who are treated for Anxiety Disorders may have a decreased response to venlafaxine. However, patients with this genotype who are treated for Depressive Disorder may have an increased response to venlafaxine	
	HTR2A rs7997012 A/A (WT)	Evidence ★
	Patients with the wild-type genotype may be less likely to respond to venlafaxine as compared to patients with the heterozygous or homozygous genotype.	
	ABCB1 rs2235015 C/A (HET) ABCB1 rs1045642 G/G (HOM)	Evidence ★
	Consider label recommended dosage of Venlafaxine if no contraindication.	
Verapamil	CACNA1C rs1051375 G/A (HET) KCNIP1 rs11739136 C/C (WT) NR1H3 rs11039149 A/A (WT)	Evidence ★
	Consider label recommended dosage of Verapamil if no contraindication.	
Warfarin	VKORC1 rs9923231 C/T (HET). CYP2C9 *1/*1 *Extensive (normal) metabolizer.*	Evidence ★★★
	The CYP2C9 *1/*1 genotype is a fully functional, extensive (normal) metabolizer of Warfarin, and the VKORC1 heterozygous variant is associated with increased sensitivity to Warfarin. Recommended daily warfarin doses (mg/day) to achieve a therapeutic INR based on CYP2C9 and VKORC1 genotype using the warfarin product insert approved by the United States Food and Drug Administration: 5-7 mg / day.	
	VKORC1 rs9934438 G/A (HET)	Evidence ★★★
	Patients with the heterozygous rs9934438 genotype who are treated with warfarin may require a lower dose as compared to patients with the wild-type genotype.	
	VKORC1 rs7294 C/C (WT)	Evidence ★★★
	Consider label recommended dosage of Warfarin if no contraindication.	

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		Evidence
VKORC1 rs17708472 G/A (HET)		
Patients with the heterozygous rs17708472 genotype: 1) may require a higher dose of warfarin as compared to patients with the wild-type genotype 2) may have an increased risk of warfarin resistance as compared to patients with the wild-type genotype.		★★
VKORC1 rs2359612 A/G (HET)		Evidence
Patients with the heterozygous rs2359612 genotype who are treated with warfarin may require a higher dose as compared to patients with the wild-type genotype but a lower dose as compared to patients with the homozygous genotype.		★★
VKORC1 rs8050894 C/G (HET)		Evidence
Patients with the heterozygous rs8050894 genotype who are treated with warfarin may require a lower dose as compared to patients with the wild-type genotype.		★★
CYP2C9 rs7900194 G/G (WT)	*Extensive (normal) metabolizer.*	Evidence
CYP2C9 rs28371686 C/C (WT)	*Extensive (normal) metabolizer.*	★★
CYP2C9 rs56165452 T/T (WT)	*Extensive (normal) metabolizer.*	
Consider label recommended dosage of Warfarin if no contraindication.		
CYP2C9 rs28371685 C/C (WT)	*Extensive (normal) metabolizer.*	Evidence
CYP2C9 rs9332131 A/A (WT)	*Extensive (normal) metabolizer.*	★
Consider label recommended dosage of Warfarin if no contraindication.		

KEY FOR VARIANT-DRUG COMBINATION EVIDENCE

★★★	Replicated in multiple studies with statistical significance and strong effect size.
★★	Replicated in multiple studies with and without statistical significance and effect size may be minimal.
★	Not yet replicated or replicated but lacking clear evidence of an association.
	Notable information is available and special considerations may be of interest when prescribing for this genotype.
	Literature does not indicate additional risks, benefits, or prescription changes to consider for this genotype.

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REPORTED GENOTYPES

This panel performs genotyping analysis on key genes and variant hot-spot regions, focused on analyzing loci documented as altering the effectiveness of drug metabolism. Key genotyping results include the following:

ABCB1
rs1045642:G/G Hom
rs2032582:C/C Hom
rs1128503:G/G Hom
rs2235015:C/A Het

ABCG2
rs2231142:G/G Wild

ADRA2A
rs1800544:G/C Het

ADRB1
rs1801252:A/A Wild

AGT
rs5051:C/T Het
rs699:A/G Het

CACNA1C
rs1051375:G/A Het

CES1
rs71647871:C/C Wild

CFTR
rs267606723:G/G Wild
rs193922525:G/G Wild
rs199826652:TCT/TCT Wild
rs75527207:G/G Wild
rs121908755:G/G Wild
rs80282562:G/G Wild
rs121908757:A/A Wild
rs121909005:T/T Wild
rs121909013:G/G Wild
rs74503330:G/G Wild
rs121909041:T/T Wild

COMT
rs4680:G/G Wild

CYP1A2
rs2069526:T/T Wild
rs2470890:C/T Het
rs4646425:C/C Wild
rs4646427:T/T Wild
rs762551:C/A Het

CYP2C19
CYP2C19 *1/*17
rs4244285:G/G Wild
rs4986893:G/G Wild
rs28399504:A/A Wild
rs56337013:C/C Wild
rs72552267:G/G Wild
rs72558186:T/T Wild
rs41291556:T/T Wild
rs17884712:G/G Wild
rs6413438:C/C Wild
rs55640102:A/A Wild
rs12248560:C/T Het

CYP2C9
CYP2C9 *1/*1
rs1799853:C/C Wild
rs1057910:A/A Wild
rs28371686:C/C Wild
rs9332131:A/A Wild
rs7900194:G/G Wild
rs28371685:C/C Wild
rs56165452:T/T Wild

CYP2D6
CYP2D6 *3/*4
rs16947:G/G Hom
rs1135840:G/C Het
rs35742686:T/- Het
rs1135824:T/T Wild
rs1065852:G/A Het
rs3892097:C/T Het
rs5030655:A/A Wild
rs5030867:T/T Wild
rs5030865:C/C Wild
rs5030656:CTT/CTT Wild
rs5030863:C/C Wild
rs5030862:C/C Wild
rs72549357:C/C Wild
rs28371706:G/G Wild
rs59421388:C/C Wild
rs769258:C/C Wild
rs28371725:C/C Wild
rs28371696:C/C Wild
rs28371717:C/C Wild

CYP3A4
CYP3A4 *1/*1
rs12721627:G/G Wild
rs2242480:C/C Wild
rs12721629:G/G Wild
rs4987161:A/A Wild
rs72552799:C/C Wild
rs67784355:G/G Wild
rs4986909:G/G Wild
rs35599367:G/G Wild
rs67666821:G/G Wild

CYP3A5
CYP3A5 *3/*3
rs776746:C/C Wild

DPYD
DPYD *1/*1
rs67376798:T/T Wild
rs3918290:C/C Wild
rs55886062:A/A Wild
rs2297595:T/T Wild
rs17376848:A/A Wild
rs1801159:T/T Wild
rs1801158:C/C Wild
rs115232898:T/T Wild

DRD1
rs4532:C/C Wild

DRD2
rs1079598:A/A Wild
rs1799732:T/TG Het
rs1799978:T/T Wild
rs6277:G/A Het

DRD3
rs167771:A/A Hom
rs6280:C/T Het
rs963468:G/A Het

EDN1
rs5370:G/G Wild

F2
rs1799963:G/G Wild

F5
rs6025:C/C Hom

GNB3
rs2301339:G/G Wild
rs5443:C/C Wild

GRIK4
rs1954787:T/C Het

HTR1A
rs10042486:C/T Het
rs6295:C/G Het

HTR2A
rs7997012:A/A Wild
rs9316233:C/C Wild
rs6313:G/G Wild
rs6311:C/C Wild

HTR2C
rs1414334:C/C Wild
rs3813928:G/G Wild
rs3813929:C/C Wild
rs518147:C/C Hom
rs6318:C/C Hom

IFNL3
rs12979860:C/T Het
rs8099917:T/T Wild
rs8103142:T/C Het

KCNIP1
rs11739136:C/C Wild

LDLR
rs688:C/C Wild

MTHFR
rs1801133:G/G Wild
rs1801131:G/G Hom

NR1H3
rs11039149:A/A Wild

OPRM1
rs2281617:C/C Wild
rs510769:C/T Het

RYR1
rs118192161:C/C Wild
rs121918592:G/G Wild
rs118192162:A/A Wild
rs118192172:C/C Wild
rs118192175:C/C Wild
rs118192163:G/G Wild
rs118192176:G/G Wild
rs118192177:C/C Wild
rs121918593:G/G Wild
rs28933397:C/C Wild
rs121918594:G/G Wild
rs118192167:A/A Wild
rs121918595:C/C Wild
rs118192170:T/T Wild

SLC6A2
rs3785143:C/C Wild
rs12708954:C/C Wild

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SLCO1B1
rs4149056:T/T Wild
rs11045819:C/A Het
rs2306283:A/G Het
rs4149015:G/G Wild
rs4149081:G/A Het

TPMT
TPMT *1/*1
rs1142345:T/T Wild
rs1800584:C/C Wild
rs1800460:C/C Wild
rs1800462:C/C Wild

VKORC1
rs9923231:C/T Het
rs9934438:G/A Het
rs17708472:G/A Het
rs2359612:A/G Het
rs7294:C/C Wild
rs8050894:C/G Het

Reported genotype calls are all displayed with respect to the positive DNA strand. Variants indicated as homozygous (Hom) or heterozygous (Het) differ from the GRCh37/hg19 reference sequence (Wild). This report is limited to the following star-alleles: CYP2D6: *1, *2, *3, *3B, *4, *5, *6C, *6, *7, *8, *9, *10, *11, *12, *14A, *14B, *15, *17, *29, *33, *35A, *41, *45A & *46. CYP2C19: *1, *2, *3, *4B, *4, *5, *6, *7, *8, *9, *10, *12 & *17. CYP2C9: *1, *2 & *3. CYP3A5: *1 & *3. CYP3A4: *1, *8, *11, *12, *13, *16, *17 & *22. TPMT: *1, *2, *3A, *3C, *3B & *4. DPYD: *1, *2, *4, *5, *13 & rs67376798A. Any genotype identified as a default star-allele (CYP2D6 *2, CYP2C19 *1, CYP2C9 *1, CYP3A5 *3, CYP3A4 *1, TPMT *1, DPYD *1) indicates the absence only of the other alleles listed and does not imply that other variants in the gene are absent. Full allele deletions and duplications are only analyzed for the CYP2D6 gene. This test does not report polymorphisms other than those specifically listed, and mutations in other genes associated with drug metabolism will not be detected. Rare diagnostic errors may occur if variations occur in primer site locations.

DISCLAIMER

The information presented on this report is provided as supplementary health information. The results presented are intended for use by a physician, pharmacist or other healthcare professional to advise a patient on the use of prescribed medications. This test is not a 510k cleared test, but managed by CMS and FDA under the Clinical Laboratory Improvement Amendment (CLIA) as a LDT. The ordering physician is responsible for the diagnosis and management of disease and decisions based on the data provided. Results are dependent on adequate specimen collection and processing.

METHODOLOGY

Genomic DNA is extracted from dry buccal swabs using magnetic particle processing. DNA from patient samples are amplified with primers specific for ABCB1, ABCG2, ADRA2A, ADRB1, AGT, CACNA1C, CES1, CFTR, COMT, CYP1A2, CYP2C19, CYP2C9, CYP2D6, CYP3A4, CYP3A5, DPYD, DRD1, DRD2, DRD3, EDN1, F2, F5, GNB3, GRIK4, HTR1A, HTR2A, HTR2C, IFNL3, KCNIP1, LDLR, MTHFR, NR1H3, OPRM1, RYR1, SLC6A2, SLCO1B1, TPMT & VKORC1 using Nested Patch PCR (Varley, et. al.). Positive and negative controls are used with each run. Patient samples, positive, and negative controls are sequenced using a MiSeq (Illumina). Sequences are analyzed using alignment and base call algorithms with Kailos Blue Software for the presence or absence of single nucleotide base changes, insertions and deletions. LR-PCR utilized for confirmation of CYP2D6 duplications and deletions. Results and recommendations are compiled as part of a medical report.

Genetic testing was performed in the Kailos Genetics CLIA facility at 601 Genome Way; Huntsville, Al. 35806. CLIA#: 01D2016114. Medical Director: Ronald McGlennen MD, FCAP, FACMG, ABMG.

This report was reviewed and approved for release by CLIA Lab Manager & Supervisor: Michele R. Erickson-Johnson, PhD, MB (ASCP)^{CM}

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