admera health

# SAMPLE REPORT

Admera Health, LLC
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**PATIENT INFORMATION**

Name: Wong, Eric
DOB: November 8, 1974
Age: 42
Sex: Male
Address: 126 Corporate Blvd.
South Plainfield, NJ 07080

**SAMPLE**

Date Collected: November 1, 2016
Date Received: November 1, 2016
Case ID: PGXPL16-000211
Source: Buccal Swabs

**REFERRING PHYSICIAN**

Name: Jane Doe, MD
Institution: Local Hospital
Phone: 123-456-7890

## Comprehensive Drug Information for Wong, Eric

PGxOne™ Plus

**ICD-10: E78.5 Hyperlipidemia, unspecified; E87.5 Hyperkalemia; I21.09 STEMI involving oth coronary artery of anterior wall; I65.29 Occlusion and stenosis of unspecified carotid artery**

### CONSIDER ALTERNATIVE

| Drug Impacted | Recommendation |
|---|---|
| Atorvastatin (Lipitor®) | CONSIDER ALTERNATIVES |
| Clopidogrel (Plavix®) | |
| Lovastatin (Mevacor®) | |
| Simvastatin (Zocor®) | |
| Ticagrelor (Brilinta®) | |

### DOSE RECOMMENDATION

| Drug Impacted | Recommendation |
|---|---|
| Phenprocoumon (Marcoumar®) | INCREASE DOSE |
| Atorvastatin (Lipitor®) | DECREASE DOSE to lowest necessary dose daily |
| Lovastatin (Mevacor®) | |
| Simvastatin (Zocor®) | |
| Warfarin (Coumadin®) | DECREASE DOSE Warfarin daily dose 3-4mg |

### NORMAL RESPONSE EXPECTED

| Drug Impacted | Recommendation |
|---|---|
| Atenolol (Tenormin®) | NORMAL RESPONSE EXPECTED |
| Benazepril (Lotensin®) | |
| Perindopril (Aceon®) | |
| Bumetanide (Bumex®) | |
| Furosemide (Lasix®) | |
| Hydrochlorothiazide (Microzide®) | |

### PROCEED WITH CAUTION

| Drug Impacted | Recommendation |
|---|---|
| Amlodipine (Norvasc®) | USE CAUTION |
| Diltiazem (Cardizem®) | |
| Felodipine (Plendil®) | |
| Lercanidipine (Zanidip®) | |
| Nisoldipine (Sular®) | |
| Nitrendipine (Nitrepin®) | |

Only selected drugs are listed here due to limited space.
Please refer to Patient Specific Genotype Results table for comprehensive illustration of drugs in each action category.

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PGxOne™ Plus

# Patient Specific Genotype Results and Comprehensive Drug Information for **Wong, Eric**

**ICD-10: E78.5 Hyperlipidemia, unspecified;E87.5 Hyperkalemia;I21.09 STEMI involving oth coronary artery of anterior wall;I65.29 Occlusion and stenosis of unspecified carotid artery;I63.50 Cereb infrc due to unsp occls or stenos of unsp cereb artery;R73.09 Other abnormal glucose**

| Action | Drug Impacted | Clinical Interpretation | Gene | Genotype | Phenotype |
|---|---|---|---|---|---|
|  | **Antiplatelets:** Clopidogrel (Plavix®) | **CONSIDER ALTERNATIVES** (if no contraindication e.g., prasugrel, ticagrelor) | CYP2C19 | *1/*2 | Intermediate Metabolizer |
|  | **Antiplatelets:** Ticagrelor (Brilinta®) | **CONSIDER ALTERNATIVES** | CYP3A4 | *1B/*1B | Poor Metabolizer |
|   | **Antilipemic Agents (Statins):** Atorvastatin (Lipitor®) | **CONSIDER ALTERNATIVES** (e.g., pitavastatin, pravastatin, rosuvastatin) OR **DECREASE DOSE** to lowest necessary dose daily due to Increased risk for myopathy and rhabdomyolysis | CYP3A4 | *1B/*1B | Poor Metabolizer |
|   | **Antilipemic Agents (Statins):** Lovastatin (Mevacor®) | **CONSIDER ALTERNATIVES** (e.g., pitavastatin, pravastatin, rosuvastatin) OR **DECREASE DOSE** to lowest necessary dose daily due to Increased risk for myopathy and rhabdomyolysis | CYP3A4 | *1B/*1B | Poor Metabolizer |
|   | **Antilipemic Agents (Statins):** Simvastatin (Zocor®) | **CONSIDER ALTERNATIVES** (e.g., pitavastatin, pravastatin, rosuvastatin) OR **DECREASE DOSE** to lowest necessary dose daily due to Increased risk for myopathy and rhabdomyolysis | CYP3A4 | *1B/*1B | Poor Metabolizer |

| Action | Drug Impacted | Clinical Interpretation | Gene | Genotype | Phenotype |
|---|---|---|---|---|---|
| | **Anticoagulants:** Warfarin (Coumadin®) | **DECREASE DOSE** Warfarin daily dose 3-4mg | CYP2C9 | *1/*1 | Normal Metabolizer |
| | **Anticoagulants:** Warfarin (Coumadin®) | **DECREASE DOSE** Warfarin daily dose 3-4mg | VKORC1 | -1639G>A/-1639G>A | rs9923231 A Allele Carrier |
| | **Anticoagulants:** Phenprocoumon (Marcoumar®) | **INCREASE DOSE** | CYP4F2 | *1/*3 | Intermediate Metabolizer |
| | **Anticoagulants:** Rivaroxaban (Xarelto®) | **USE CAUTION** due to increased bleeding risk | CYP3A4 | *1B/*1B | Poor Metabolizer |
| | **Calcium Channel Blockers:** Amlodipine (Norvasc®), Diltiazem (Cardizem®), Felodipine (Plendil®), Lercanidipine (Zanidip®), Nisoldipine (Sular®), Nitrendipine (Nitrepin®) | **USE CAUTION** due to significant increase in drug exposure and therefore clinical monitoring and dose adjustment may thus be required | CYP3A4 | *1B/*1B | Poor Metabolizer |
| | **Calcium Channel Blockers:** Nifedipine (Adalat®) | **USE CAUTION** due to increased risk for QTc prolongation | NOS1AP | WT/c.106-38510G>T | rs10494366 GT genotype/rs10800397 C Allele Carrier/rs10919035 C Allele Carrier |
| | **Proton Pump Inhibitors (PPIs):** Dexlansoprazole (Dexilant®), Esomeprazole (Nexium®), Lansoprazole (Prevacid®), Omeprazole (Prilosec®), Pantoprazole (Protonix®), Rabeprazole (Aciphex®) | **USE CAUTION** due to higher drug plasma levels | CYP2C19 | *1/*2 | Intermediate Metabolizer |
| | **Vasodilators:** Hydralazine | **USE CAUTION** due to decreased drug response | NAT2 | *4/*4 | Rapid Acetylator |
| | **ACE Inhibitors:** Benazepril (Lotensin®), Perindopril (Aceon®) | **NORMAL RESPONSE EXPECTED** | ACE | WT/WT | ACE Deletion |
| | **ACE Inhibitors:** Captopril (Capoten®), Perindopril (Aceon®) | **NORMAL RESPONSE EXPECTED** | AGTR1 | WT/WT | rs5186 AA genotype |
| | **ACE Inhibitors:** Captopril (Capoten®), Quinapril (Accupril®) | **NORMAL RESPONSE EXPECTED** | ACE | WT/WT | ACE Deletion |
| | **Angiotensin II Receptor Blockers:** Candesartan (Atacand®) | **NORMAL RESPONSE EXPECTED** | AGTR1 | WT/WT | rs5186 AA genotype |

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| Action | Drug Impacted | Clinical Interpretation | Gene | Genotype | Phenotype |
|---|---|---|---|---|---|
| ✓ | **Angiotensin II Receptor Blockers:** Irbesartan (Avapro®) | NORMAL RESPONSE EXPECTED | ACE | WT/WT | ACE Deletion |
| ✓ | **Angiotensin II Receptor Blockers:** Losartan (Cozaar®) | NORMAL RESPONSE EXPECTED | ABCB1 | c.3435T>C/c.2677T>G | rs2032582 AC genotype/rs1045642 AG genotype |
| ✓ | **Angiotensin II Receptor Blockers:** Losartan (Cozaar®) | NORMAL RESPONSE EXPECTED | AGTR1 | WT/WT | rs5186 AA genotype |
| ✓ | **Antilipemic Agents (Statins):** Fenofibrate (Tricor®) | NORMAL RESPONSE EXPECTED | APOE | WT/WT | Non E2 Carrier |
| ✓ | **Antilipemic Agents (Statins):** Fluvastatin (Lescol®) | NORMAL RESPONSE EXPECTED | ACE | WT/WT | ACE Deletion |
| ✓ | **Antilipemic Agents (Statins):** Pitavastatin (Livalo®), Pravastatin (Pravachol®) | NORMAL RESPONSE EXPECTED | SLCO1B1 | *1/*1 | Normal Activity |
| ✓ | **Antilipemic Agents (Statins):** Pravastatin (Pravachol®) | NORMAL RESPONSE EXPECTED | KIF6 | c.2155T>C/c.2155T>C | rs20455 non-AA genotype |
| ✓ | **Beta Blockers:** Atenolol (Tenormin®) | NORMAL RESPONSE EXPECTED | ADRA2A | WT/WT | rs1800544 GG genotype/rs1800545 GG genotype |
| ✓ | **Beta Blockers:** Carvedilol (Coreg®) | NORMAL RESPONSE EXPECTED | CYP2D6 | *10/*10 | Normal Metabolizer |
| ✓ | **Beta Blockers:** Metoprolol (Lopressor®) | NORMAL RESPONSE EXPECTED | CYP2D6 | *10/*10 | Normal Metabolizer |
| ✓ | **Beta Blockers:** Nebivolol (Bystolic®), Propranolol (Inderal LA®) | NORMAL RESPONSE EXPECTED | CYP2D6 | *10/*10 | Normal Metabolizer |
| ✓ | **Calcium Channel Blockers:** Verapamil (Calan®) | NORMAL RESPONSE EXPECTED | NOS1AP | WT/c.106-38510G>T | rs10494366 GT genotype/rs10800397 C Allele Carrier/rs10919035 C Allele Carrier |
| ✓ | **Diuretics:** Bumetanide (Bumex®), Furosemide (Lasix®), Hydrochlorothiazide (Microzide®), Torsemide (Demadex®) | NORMAL RESPONSE EXPECTED | ACE | WT/WT | ACE Deletion |

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| Action | Drug Impacted | Clinical Interpretation | Gene | Genotype | Phenotype |
|---|---|---|---|---|---|
| ✓ | **Diuretics:** Hydrochlorothiazide (Microzide®) | NORMAL RESPONSE EXPECTED | AGTR1 | WT/WT | rs5186 AA genotype |
| ✓ | **Diuretics:** Spironolactone (Aldactone®) | NORMAL RESPONSE EXPECTED | ACE | WT/WT | ACE Deletion |
| ✓ | **Selective Serotonin Reuptake Inhibitors (SSRIs):** Fluoxetine (Prozac®) | NORMAL RESPONSE EXPECTED | CYP2D6 | *10/*10 | Normal Metabolizer |
| ✓ | **Vasodilators:** Nitroprusside (Nitropress®) | NORMAL RESPONSE EXPECTED | ACE | WT/WT | ACE Deletion |

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Current Medication Information for
# Wong, Eric

PGxOne™ Plus

| Action | Drug Impacted | Clinical Interpretation | Gene | Genotype | Phenotype |
|---|---|---|---|---|---|
|  | **Antiplatelets:** Plavix | **CONSIDER ALTERNATIVES** (if no contraindication e.g., prasugrel, ticagrelor) | CYP2C19 | *1/*2 | Intermediate Metabolizer |
|   | **Antilipemic Agents (Statins):** Atorvastatin | **CONSIDER ALTERNATIVES** (e.g., pitavastatin, pravastatin, rosuvastatin) OR **DECREASE DOSE** to lowest necessary dose daily due to Increased risk for myopathy and rhabdomyolysis | CYP3A4 | *1B/*1B | Poor Metabolizer |
|   | **Antilipemic Agents (Statins):** Simvastatin | **CONSIDER ALTERNATIVES** (e.g., pitavastatin, pravastatin, rosuvastatin) OR **DECREASE DOSE** to lowest necessary dose daily due to Increased risk for myopathy and rhabdomyolysis | CYP3A4 | *1B/*1B | Poor Metabolizer |
|  | **Calcium Channel Blockers:** Norvasc | **USE CAUTION** due to significant increase in drug exposure and therefore clinical monitoring and dose adjustment may thus be required | CYP3A4 | *1B/*1B | Poor Metabolizer |
|  | **Proton Pump Inhibitors (PPIs):** Omeprazole | **USE CAUTION** due to higher drug plasma levels | CYP2C19 | *1/*2 | Intermediate Metabolizer |
|  | **Beta Blockers:** Carvedilol | **NORMAL RESPONSE EXPECTED** | CYP2D6 | *10/*10 | Normal Metabolizer |
|  | **Selective Serotonin Reuptake Inhibitors (SSRIs):** Fluoxetine | **NORMAL RESPONSE EXPECTED** | CYP2D6 | *10/*10 | Normal Metabolizer |
|  | **Vitamins:** Niacin | **CLINICAL EVIDENCE NOT SUFFICIENT** | MTHFR | WT/C677T | C677T Heterozygous Mutation |

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| Action | Drug Impacted | Clinical Interpretation | Gene | Genotype | Phenotype |
|---|---|---|---|---|---|
| NA | **Antibiotics:** Clindamycin | CLINICAL EVIDENCE NOT SUFFICIENT | HLA-B | WT/WT | Wild Type |
| NA | **Supplements:** Cysteine | PHARMACOGENOMICS EVIDENCE NOT AVAILABLE | NA | NA | NA |

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# Drug-Drug Interactions for **Wong, Eric**

| Severity | Drugs | Warning | Documentation | Clinical Management |
|---|---|---|---|---|
| S | AMLODIPINE BESYLATE -- CLOPIDOGREL HYDROGEN SULFATE | **MAJOR** Concurrent use of AMLODIPINE and CLOPIDOGREL may result in decreased antiplatelet effect and increased risk of thrombotic events. | EXCELLENT | Coadministration of amlodipine and clopidogrel may decrease the effect of clopidogrel on platelet inhibition, possibly increasing the risk of atherothrombotic events (Siller-Matula et al, 2008; Lee et al, 2011). The addition of cilostazol may reduce these potentially harmful interactions (Lee et al, 2011). Use caution if amlodipine and clopidogrel are used concurrently and monitor patients for loss of clopidogrel efficacy. |
| S | AMLODIPINE BESYLATE -- SIMVASTATIN | **MAJOR** Concurrent use of AMLODIPINE and SIMVASTATIN may result in increased simvastatin exposure and increased risk of myopathy, including rhabdomyolysis. | GOOD | Concurrent administration of amlodipine and simvastatin increased the AUC and Cmax of simvastatin. If it is necessary to coadminister amlodipine and simvastatin, the dose of simvastatin should not exceed 20 mg/day (Prod Info AZOR® oral tablets, 2017; Prod Info ZOCOR® oral tablets, 2011). Patients who are stabilized on an 80-mg dose of simvastatin for more than 1 year who need to start amlodipine should be switched to a statin or statin-based regimen with less potential for drug interaction (Prod Info ZOCOR® oral tablets, 2011). |
| S | FLUOXETINE HYDROCHLORIDE -- CLOPIDOGREL HYDROGEN SULFATE | **MAJOR** Concurrent use of CLOPIDOGREL and FLUOXETINE may result in paradoxical effects due to decreased plasma concentrations of the active metabolite of clopidogrel and additive bleeding risk . | FAIR | Use caution with the concomitant use of clopidogrel and fluoxetine, as an increased risk of bleeding has been demonstrated with the concomitant use of some SSRIs and antiplatelet drugs (Prod Info Fluoxetine oral capsules, 2011). Concomitant use of clopidogrel and fluoxetine also has the potential for reduced clopidogrel active metabolite concentrations and reduced platelet inhibition (Prod Info PLAVIX® oral tablets, 2011). |
| S | NIACIN -- ATORVASTATIN CALCIUM | **MAJOR** Concurrent use of ATORVASTATIN and NIACIN may result in an increased risk of myopathy or rhabdomyolysis. | FAIR | If concurrent therapy of atorvastatin and lipid-modifying doses of niacin (1g/day or greater) is required, consider a reduction in the atorvastatin dose and monitor the patient for signs and symptoms of myopathy or rhabdomyolysis (muscle pain, tenderness, or weakness). Consider monitoring creatine kinase (CK) levels, and discontinue atorvastatin if CK levels show a marked increase or if myopathy or rhabdomyolysis is diagnosed or suspected (Prod Info LIPITOR® oral tablets, 2012). |
| S | NIACIN -- SIMVASTATIN | **MAJOR** Concurrent use of NIACIN and SIMVASTATIN may result in increased niacin and simvastatin exposure; increased risk of myopathy or rhabdomyolysis. | EXCELLENT | Myopathy, including rhabdomyolysis, has been reported with concurrent use of simvastatin and lipid-modifying doses of niacin (1 g/day or greater) in patients of all ethnicities. Evaluate the benefit/risk of concomitant use. Chinese patients in particular should not receive an 80-mg dose of simvastatin and caution should be used when exceeding any dose over 20 mg/day of simvastatin when coadministered with lipid-modifying doses of niacin-containing products. It is not known if the risk of myopathy seen in Chinese patients applies to other Asian patients (Prod Info ZOCOR® oral tablets, 2011). Monitor the patient for signs and symptoms of myopathy or rhabdomyolysis (muscle pain, tenderness, or weakness). Periodic creatine kinase determinations may be advisable. Discontinue simvastatin immediately if myopathy or rhabdomyolysis is suspected or diagnosed. |
| S | OMEPRAZOLE -- CLOPIDOGREL HYDROGEN SULFATE | **MAJOR** Concurrent use of CLOPIDOGREL and OMEPRAZOLE may result in reduction in clinical efficacy of clopidogrel and increased risk for thrombosis. | EXCELLENT | Concomitant use of clopidogrel and omeprazole reduces levels of the clopidogrel active metabolite and reduces platelet inhibition when given either concomitantly or 12 hours apart. Avoid concomitant use of clopidogrel and omeprazole (Prod Info PLAVIX® oral tablets, 2016). Pantoprazole (Angiolillo et al, 2010), dexlansoprazole, and lansoprazole have less effect on the antiplatelet activity of clopidogrel (Prod Info PLAVIX® oral tablets, 2016). |

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| Severity | Drugs | Warning | Documentation | Clinical Management |
|---|---|---|---|---|
|  | ATORVASTATIN CALCIUM -- CLOPIDOGREL HYDROGEN SULFATE | **MODERATE** Concurrent use of CLOPIDOGREL and CYP3A4 METABOLIZED STATINS may result in decreased formation of clopidogrel active metabolite resulting in high on-treatment platelet reactivity. | EXCELLENT | If a patient develops high on-treatment platelet reactivity during treatment with clopidogrel and a statin metabolized by CYP3A4 (ie, atorvastatin, lovastatin, or simvastatin), discontinue the statin and substitute a statin that is not metabolized by CYP3A4 (ie, pravastatin or rosuvastatin) (Park et al, 2012). |
|  | CLOPIDOGREL HYDROGEN SULFATE -- SIMVASTATIN | **MODERATE** Concurrent use of CLOPIDOGREL and CYP3A4 METABOLIZED STATINS may result in decreased formation of clopidogrel active metabolite resulting in high on-treatment platelet reactivity. | EXCELLENT | If a patient develops high on-treatment platelet reactivity during treatment with clopidogrel and a statin metabolized by CYP3A4 (ie, atorvastatin, lovastatin, or simvastatin), discontinue the statin and substitute a statin that is not metabolized by CYP3A4 (ie, pravastatin or rosuvastatin) (Park et al, 2012). |

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# Drug-Food Interactions for **Wong, Eric**

PGxOne™ Plus

| Severity | Drugs | Warning | Documentation | Clinical Management |
|---|---|---|---|---|
| S | CLOPIDOGREL HYDROGEN SULFATE -- GRAPEFRUIT JUICE | **MAJOR** Concurrent use of CLOPIDOGREL and GRAPEFRUIT JUICE may result in reduced exposure of the active clopidogrel metabolite. | EXCELLENT | Advise patients to avoid consuming grapefruit juice during clopidogrel therapy, as decreased plasma concentrations and reduced antiplatelet activity of the active clopidogrel metabolite may result (Holmberg et al, 2013). |
| S | SIMVASTATIN -- CRANBERRY JUICE | **MAJOR** Concurrent use of SIMVASTATIN and CRANBERRY JUICE may result in increased risk of hepatitis and myopathy/rhabdomyolysis. | GOOD | Concomitant use of simvastatin and consumption of cranberry juice may lead to hepatitis, myopathy, and/or rhabdomyolysis (Goldenberg et al, 2012). When concurrent consumption occurs, instruct patients to promptly report any unexplained muscle pain or symptoms of hepatitis, such as yellow skin or eyes, dark-colored urine, or pale stools. |
| S | SIMVASTATIN -- GRAPEFRUIT JUICE | **MAJOR** Concurrent use of SIMVASTATIN and GRAPEFRUIT JUICE may result in increased bioavailability of simvastatin resulting in an increased risk of myopathy or rhabdomyolysis. | EXCELLENT | Avoid consumption of grapefruit juice in patients receiving simvastatin therapy (Prod Info ZOCOR® oral tablets, 2015). Orange juice may be substituted for grapefruit juice. Alternatively, substitute an HMG-CoA reductase inhibitor (fluvastatin, pravastatin, rosuvastatin) that is not a substrate of CYP3A4 metabolism. |
| ! | ATORVASTATIN CALCIUM -- GRAPEFRUIT JUICE | **MODERATE** Concurrent use of ATORVASTATIN and GRAPEFRUIT JUICE may result in increased bioavailability of atorvastatin resulting in an increased risk of myopathy or rhabdomyolysis. | EXCELLENT | The ingestion of large quantities of grapefruit juice, especially in excess of 1.2 liters per day, with atorvastatin can result in elevated atorvastatin plasma levels and an increased risk for myopathy (Prod Info LIPITOR® oral tablets, 2009). Monitor for increased atorvastatin side effects. |
| ! | CLOPIDOGREL HYDROGEN SULFATE -- CELERY | **MODERATE** Concurrent use of ANTIPLATELET AGENTS and CELERY may result in increased risk of bleeding. | FAIR | Avoid concomitant use of celery with antiplatelet agents. If both are taken together monitor the patient closely for signs and symptoms of bleeding. |
| ! | OMEPRAZOLE -- CRANBERRY | **MODERATE** Concurrent use of PROTON PUMP INHIBITORS and CRANBERRY may result in reduced effectiveness of proton pump inhibitors. | GOOD | Advise patients to avoid regular use of cranberry juice while taking a proton pump inhibitor. Occasional use of cranberry juice is not likely to have a clinical effect on proton pump inhibitor effectiveness. The effect of cranberry extract supplements on gastric acid is not known, caution is advised. |

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Drug-Alcohol Interactions for
# Wong, Eric

PGxOne™ Plus

| Severity | Drugs | Warning | Documentation | Clinical Management |
|---|---|---|---|---|
| ! | NIACIN -- ETHANOL | **MODERATE** Concurrent use of NIACIN and ETHANOL may result in increase in side effects of flushing and pruritus. | GOOD | Alcohol may potentiate the adverse effects of niacin. Concomitant alcohol may increase the side effects of flushing and pruritus and should be avoided around the time of niacin ingestion. |

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# Drug-Lab Interactions for **Wong, Eric**

PGxOne™ Plus

| Severity | Drugs | Warning | Documentation | Clinical Management |
|---|---|---|---|---|
| S | OMEPRAZOLE -- CHROMOGRANIN A MEASUREMENT | **MAJOR** OMEPRAZOLE may result in may interfere with diagnostic investigation for neuroendocrine tumors due to serum chromogranin A (CgA) levels increase with decreases in gastric acidity. | FAIR | Omeprazole should be temporarily stopped at least 14 days prior to assessing serum chromogranin A (CgA) levels, as a reduction in gastric acidity may cause increased CgA levels and result in a false positive diagnostic evaluation for neuroendocrine tumors. Repeat testing should be considered if initial CgA levels are high. If multiple tests are performed for monitoring purposes, the same commercial laboratory should be used as reference ranges may vary (Prod Info PRILOSEC® oral delayed-release suspension, 2014). |
| ! | NIACIN -- CATECHOLAMINE MEASUREMENT | **MODERATE** NIACIN may result in falsely elevated plasma or urinary catecholamine levels due to interference with the fluorescence test. | FAIR | Niacin may interfere with the fluorescence test for plasma or urinary catecholamines leading to falsely elevated levels (Prod Info NIASPAN® extended-release oral tablets, 2005). Interpret such assay results with caution in patients receiving niacin. |
| ! | NIACIN -- URINALYSIS, GLUCOSE, QUALITATIVE | **MODERATE** NIACIN may result in false-positive urine glucose measurements with cupric sulfate solution (Benedict's solution) due to mechanism unknown. | FAIR | Niacin therapy may result in false-positive urine glucose measurements when assayed using cupric sulfate solution (Benedicts's reagent) (Prod Info NIASPAN® extended-release oral tablets, 2005). Interpret results of such tests with caution in patients receiving niacin. |
| ! | OMEPRAZOLE -- SECRETIN STIMULATION TEST | **MODERATE** OMEPRAZOLE may result in risk of false positive result due to hyper-response in gastrin secretion. | FAIR | Omeprazole increases serum gastrin levels. A hyper-response in gastrin secretion that falsely suggests gastrinoma may occur if a secretin stimulation test is performed during use of omeprazole. Discontinue aspirin/omeprazole at least 14 days before testing to allow gastrin levels to return to baseline (Prod Info YOSPRALA (TM) oral delayed-release tablets, 2016). |
| ! | OMEPRAZOLE -- URINE DRUG SCREENING | **MODERATE** PROTON PUMP INHIBITORS may result in false-positive urine screening tests for tetrahydrocannabinol (THC) due to unknown. | GOOD | Proton pump inhibitors may cause false positive urine screening tests for tetrahydrocannabinol (THC). Use an alternative method to confirm positive screening tests for THC (Prod Info DEXILANT(TM) oral delayed-release capsules, 2016; Prod Info PRILOSEC® oral delayed-release capsules, 2016; Prod Info PROTONIX® I.V. intravenous injection, 2014). |

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# Portable Patient PGxOne™ Plus Genotype Results and Drug Information by Specialty for

# Wong, Eric

PGxOne™ Plus

| Therapeutic | Action | Drug Impacted | Clinical Interpretation | Gene | Genotype | Phenotype |
|---|---|---|---|---|---|---|
| Anesthesiology |  | **Local Anesthetics:** Lidocaine (Lidoderm®), Ropivacaine (Naropin®) | **USE CAUTION** due to the increased risk for loss of efficacy | CYP1A2 | *1F/*1F | Ultrarapid Metabolizer |
| Anesthesiology |  | **General Anesthetics:** Ketamine (Ketalar®), Propofol (Diprivan®) | **NORMAL RESPONSE EXPECTED** | CYP2B6 | *1/*1 | Non G516T Homozygous/Non A785G Homozygous/Non T983C Homozygous |
| Anesthesiology |  | **Local Anesthetics:** Lidocaine/Prilocaine (Emla®) | **NORMAL RESPONSE EXPECTED** | G6PD | WT/WT | Normal G6PD Efficiency |
| Anesthesiology |  | **Sedatives:** Dexmedetomidine (Precedex®) | **NORMAL RESPONSE EXPECTED** | ADRA2A | WT/WT | rs1800544 GG genotype/rs1800545 GG genotype |
| Cardiology |  | **Antiarrhythmic Drugs:** Amiodarone (Cordarone®), Dronedarone (Multaq®) | **CONSIDER ALTERNATIVES** | CYP3A4 | *1B/*1B | Poor Metabolizer |
| Cardiology |  | **Antiplatelets:** Clopidogrel (Plavix®) | **CONSIDER ALTERNATIVES** (if no contraindication e.g., prasugrel, ticagrelor) | CYP2C19 | *1/*2 | Intermediate Metabolizer |
| Cardiology |  | **Antiplatelets:** Ticagrelor (Brilinta®) | **CONSIDER ALTERNATIVES** | CYP3A4 | *1B/*1B | Poor Metabolizer |
| Cardiology |  | **Miscellaneous Cardiovascular Agents:** Ivabradine (Corlanor®) | **CONSIDER ALTERNATIVES** | CYP3A4 | *1B/*1B | Poor Metabolizer |
| Cardiology |  | **Antilipemic Agents (Statins):** Atorvastatin (Lipitor®) | **CONSIDER ALTERNATIVES** (e.g., pitavastatin, pravastatin, rosuvastatin)<br><br>OR<br><br>**DECREASE DOSE** to lowest necessary dose daily due to Increased risk for myopathy and rhabdomyolysis | CYP3A4 | *1B/*1B | Poor Metabolizer |

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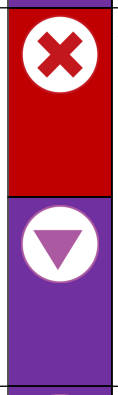
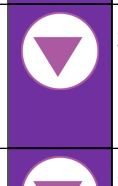
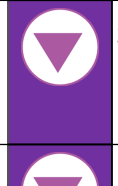
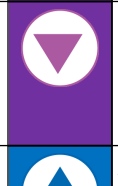
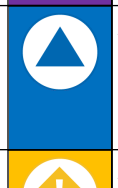
| Cardiology |  | **Antilipemic Agents (Statins):** Lovastatin (Mevacor®) | **CONSIDER ALTERNATIVES** (e.g., pitavastatin, pravastatin, rosuvastatin)<br><br>OR<br><br>**DECREASE DOSE** to lowest necessary dose daily due to Increased risk for myopathy and rhabdomyolysis | CYP3A4 | *1B/*1B | Poor Metabolizer |
| Cardiology |  | **Antilipemic Agents (Statins):** Simvastatin (Zocor®) | **CONSIDER ALTERNATIVES** (e.g., pitavastatin, pravastatin, rosuvastatin)<br><br>OR<br><br>**DECREASE DOSE** to lowest necessary dose daily due to Increased risk for myopathy and rhabdomyolysis | CYP3A4 | *1B/*1B | Poor Metabolizer |
| Cardiology |  | **Anticoagulants:** Warfarin (Coumadin®) | **DECREASE DOSE** Warfarin daily dose 3-4mg | CYP2C9 | *1/*1 | Normal Metabolizer |
| Cardiology |  | **Anticoagulants:** Warfarin (Coumadin®) | **DECREASE DOSE** Warfarin daily dose 3-4mg | VKORC1 | -1639G>A/-1639G>A | rs9923231 A Allele Carrier |
| Cardiology |  | **Phosphodiesterase Inhibitors:** Cilostazol (Pletal®) | **DECREASE DOSE** by 50% | CYP3A4 | *1B/*1B | Poor Metabolizer |
| Cardiology |  | **Anticoagulants:** Phenprocoumon (Marcoumar®) | **INCREASE DOSE** | CYP4F2 | *1/*3 | Intermediate Metabolizer |
| Cardiology |  | **Anticoagulants:** Rivaroxaban (Xarelto®) | **USE CAUTION** due to increased bleeding risk | CYP3A4 | *1B/*1B | Poor Metabolizer |
| Cardiology |  | **Antilipemic Agents (Statins):** Rosuvastatin (Crestor®) | **USE CAUTION** due to impaired efficacy | CYP3A5 | *1A/*1A | High Expresser |

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| Cardiology | ⚠ | **Calcium Channel Blockers:** Amlodipine (Norvasc®), Diltiazem (Cardizem®), Felodipine (Plendil®), Lercanidipine (Zanidip®), Nisoldipine (Sular®), Nitrendipine (Nitrepin®) | **USE CAUTION** due to significant increase in drug exposure and therefore clinical monitoring and dose adjustment may thus be required | CYP3A4 | *1B/*1B | Poor Metabolizer |
| Cardiology | ⚠ | **Calcium Channel Blockers:** Nifedipine (Adalat®) | **USE CAUTION** due to increased risk for QTc prolongation | NOS1AP | WT/c.106-38510G>T | rs10494366 GT genotype/rs10800397 C Allele Carrier/rs10919035 C Allele Carrier |
| Cardiology | ⚠ | **Vasodilators:** Hydralazine | **USE CAUTION** due to decreased drug response | NAT2 | *4/*4 | Rapid Acetylator |
| Cardiology | ✓ | **ACE Inhibitors:** Benazepril (Lotensin®), Perindopril (Aceon®) | **NORMAL RESPONSE EXPECTED** | ACE | WT/WT | ACE Deletion |
| Cardiology | ✓ | **ACE Inhibitors:** Captopril (Capoten®), Perindopril (Aceon®) | **NORMAL RESPONSE EXPECTED** | AGTR1 | WT/WT | rs5186 AA genotype |
| Cardiology | ✓ | **ACE Inhibitors:** Captopril (Capoten®), Quinapril (Accupril®) | **NORMAL RESPONSE EXPECTED** | ACE | WT/WT | ACE Deletion |
| Cardiology | ✓ | **Angiotensin II Receptor Blockers:** Candesartan (Atacand®) | **NORMAL RESPONSE EXPECTED** | AGTR1 | WT/WT | rs5186 AA genotype |
| Cardiology | ✓ | **Angiotensin II Receptor Blockers:** Irbesartan (Avapro®) | **NORMAL RESPONSE EXPECTED** | ACE | WT/WT | ACE Deletion |
| Cardiology | ✓ | **Angiotensin II Receptor Blockers:** Losartan (Cozaar®) | **NORMAL RESPONSE EXPECTED** | ABCB1 | c.3435T>C/c.2677T>G | rs2032582 AC genotype/rs1045642 AG genotype |
| Cardiology | ✓ | **Angiotensin II Receptor Blockers:** Losartan (Cozaar®) | **NORMAL RESPONSE EXPECTED** | AGTR1 | WT/WT | rs5186 AA genotype |
| Cardiology | ✓ | **Antianginal Drugs:** Ranolazine (Ranexa®) | **NORMAL RESPONSE EXPECTED** | CYP2D6 | *10/*10 | Normal Metabolizer |
| Cardiology | ✓ | **Antiarrhythmic Drugs:** Digoxin (Lanoxin®) | **NORMAL RESPONSE EXPECTED** | ABCB1 | c.3435T>C/c.2677T>G | rs2032582 AC genotype/rs1045642 AG genotype |

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| Cardiology | ✓ | **Antiarrhythmic Drugs:** Flecainide (Tambocor®) | NORMAL RESPONSE EXPECTED | CYP2D6 | *10/*10 | Normal Metabolizer |
| Cardiology | ✓ | **Antiarrhythmic Drugs:** Propafenone (Rythmol®) | NORMAL RESPONSE EXPECTED | CYP2D6 | *10/*10 | Normal Metabolizer |
| Cardiology | ✓ | **Antilipemic Agents (Statins):** Fenofibrate (Tricor®) | NORMAL RESPONSE EXPECTED | APOE | WT/WT | Non E2 Carrier |
| Cardiology | ✓ | **Antilipemic Agents (Statins):** Fluvastatin (Lescol®) | NORMAL RESPONSE EXPECTED | ACE | WT/WT | ACE Deletion |
| Cardiology | ✓ | **Antilipemic Agents (Statins):** Pitavastatin (Livalo®), Pravastatin (Pravachol®) | NORMAL RESPONSE EXPECTED | SLCO1B1 | *1/*1 | Normal Activity |
| Cardiology | ✓ | **Antilipemic Agents (Statins):** Pravastatin (Pravachol®) | NORMAL RESPONSE EXPECTED | KIF6 | c.2155T>C/c.2155T>C | rs20455 non-AA genotype |
| Cardiology | ✓ | **Beta Blockers:** Atenolol (Tenormin®) | NORMAL RESPONSE EXPECTED | ADRA2A | WT/WT | rs1800544 GG genotype/rs1800545 GG genotype |
| Cardiology | ✓ | **Beta Blockers:** Carvedilol (Coreg®) | NORMAL RESPONSE EXPECTED | CYP2D6 | *10/*10 | Normal Metabolizer |
| Cardiology | ✓ | **Beta Blockers:** Metoprolol (Lopressor®) | NORMAL RESPONSE EXPECTED | CYP2D6 | *10/*10 | Normal Metabolizer |
| Cardiology | ✓ | **Beta Blockers:** Nebivolol (Bystolic®), Propranolol (Inderal LA®) | NORMAL RESPONSE EXPECTED | CYP2D6 | *10/*10 | Normal Metabolizer |
| Cardiology | ✓ | **Calcium Channel Blockers:** Verapamil (Calan®) | NORMAL RESPONSE EXPECTED | NOS1AP | WT/c.106-38510G>T | rs10494366 GT genotype/rs10800397 C Allele Carrier/rs10919035 C Allele Carrier |
| Cardiology | ✓ | **Diuretics:** Bumetanide (Bumex®), Furosemide (Lasix®), Hydrochlorothiazide (Microzide®), Torsemide (Demadex®) | NORMAL RESPONSE EXPECTED | ACE | WT/WT | ACE Deletion |
| Cardiology | ✓ | **Diuretics:** Hydrochlorothiazide (Microzide®) | NORMAL RESPONSE EXPECTED | AGTR1 | WT/WT | rs5186 AA genotype |

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| Cardiology | ✓ | **Diuretics:** Spironolactone (Aldactone®) | NORMAL RESPONSE EXPECTED | ACE | WT/WT | ACE Deletion |
| Cardiology | ✓ | **Vasodilators:** Nitroprusside (Nitropress®) | NORMAL RESPONSE EXPECTED | ACE | WT/WT | ACE Deletion |
| Dentistry | ✓ | **Cholinergic Agonists:** Cevimeline (Evoxac®) | NORMAL RESPONSE EXPECTED | CYP2D6 | *10/*10 | Normal Metabolizer |
| Endocrinology | ! | **Biguanides:** Metformin (Glucophage®) | USE CAUTION due to decreased drug response | ATM | WT/c.175-5285G>T | rs11212617 AC genotype |
| Endocrinology | ✓ | **Endocrine Enzyme Inhibitors:** Eliglustat (Cerdelga®) | NORMAL RESPONSE EXPECTED | CYP2D6 | *10/*10 | Normal Metabolizer |
| Endocrinology | ✓ | **Sulfonylureas:** Chlorpropamide (Diabinese®), Glimepiride (Amaryl®), Glipizide (Glucotrol®), Glyburide (Glynase®), Tolbutamide | NORMAL RESPONSE EXPECTED | G6PD | WT/WT | Normal G6PD Efficiency |
| Endocrinology | ✓ | **Thiazolidinediones:** Pioglitazone (Actos®) | NORMAL RESPONSE EXPECTED | CYP2C8 | *1/*1 | Wild Type |
| Endocrinology | ✓ | **Thiazolidinediones:** Rosiglitazone (Avandia®) | NORMAL RESPONSE EXPECTED | CYP2C8 | *1/*1 | Wild Type |
| Gastroenterology | ! | **Proton Pump Inhibitors (PPIs):** Dexlansoprazole (Dexilant®), Esomeprazole (Nexium®), Lansoprazole (Prevacid®), Omeprazole (Prilosec®), Pantoprazole (Protonix®), Rabeprazole (Aciphex®) | USE CAUTION due to higher drug plasma levels | CYP2C19 | *1/*2 | Intermediate Metabolizer |
| Gastroenterology | ✓ | **Histamine H2 Antagonists:** Famotidine (Pepcid®) | NORMAL DOSE | CYP2C19 | *1/*2 | Intermediate Metabolizer |
| Gastroenterology | ✓ | **Osmotic Laxatives:** Ascorbic Acid (MoviPrep®) | NORMAL RESPONSE EXPECTED | G6PD | WT/WT | Normal G6PD Efficiency |
| Gynecology | ✓ | **Hormonal Contraceptives:** Ethinyl Estradiol/Norelgestromin (Ortho Evra®) | NORMAL RESPONSE EXPECTED | F5 | WT/WT | Non Factor V Leiden Carrier |

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| Gynecology | ✓ | **Hormones:** Oral-Contraceptive | NORMAL RESPONSE EXPECTED | F2 | WT/WT | Wild Type |
| Gynecology | ✓ | **Mixed 5-HT1A Agonist/5-HT2A Antagonist:** Flibanserin (Addyi®) | NORMAL RESPONSE EXPECTED | CYP2C19 | *1/*2 | Intermediate Metabolizer |
| Hematology | ✓ | **Colony Stimulating Factors:** Eltrombopag (Promacta®) | NORMAL RESPONSE EXPECTED | F5 | WT/WT | Non Factor V Leiden Carrier |
| Immunology | ✗ | **Immunosuppressant Agents:** Sirolimus (Rapamune®) | CONSIDER ALTERNATIVES | CYP3A4 | *1B/*1B | Poor Metabolizer |
| Immunology | ! | **Systemic Corticosteroids:** Methylprednisolone (Medrol®), Prednisolone (Orapred®), Prednisone (Deltasone®) | USE CAUTION due to increased risk of Osteonecrosis | ABCB1 | c.3435T>C/c.2677T>G | rs2032582 AC genotype/rs1045642 AG genotype |
| Immunology | ✓ | **5-Aminosalicylic Acid Derivatives:** Sulfasalazine (Azulfidine®) | NORMAL RESPONSE EXPECTED | G6PD | WT/WT | Normal G6PD Efficiency |
| Immunology | ✓ | **Antigout Agents:** Lesinurad (Zurampic®) | NORMAL RESPONSE EXPECTED | CYP2C9 | *1/*1 | Normal Metabolizer |
| Immunology | ✓ | **Antirheumatic Immunosuppressants:** Methotrexate (Trexall®) | NORMAL RESPONSE EXPECTED | ITPA | WT/WT | Non-protective Wild Type |
| Immunology | ✓ | **Immunosuppressant Agents:** Cyclosporine (Gengraf®), Tacrolimus (Prograf®) | NORMAL RESPONSE EXPECTED | CYP3A5 | *1A/*1A | High Expresser |
| Immunology | ✓ | **Immunosuppressive Drugs:** Azathioprine (Imuran®) | NORMAL RESPONSE EXPECTED | TPMT | *1/*1 | Normal Metabolizer |
| Immunology | ✓ | **Urate-Oxidase (Recombinent):** Pegloticase (Krystexxa®) | NORMAL RESPONSE EXPECTED | G6PD | WT/WT | Normal G6PD Efficiency |
| Immunology | ✓ | **Uricosuric Agents:** Probenecid | NORMAL RESPONSE EXPECTED | G6PD | WT/WT | Normal G6PD Efficiency |
| Immunology | ✓ | **Xanthine Oxidase Inhibitors:** Allopurinol (Zyloprim®) | NORMAL RESPONSE EXPECTED | HLA-B | WT/WT | Wild Type |

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| Infectious Diseases | ! | **Antihepaciviral Drugs:** Boceprevir (Victrelis®), Peginterferon alfa-2b (PegIntron®), Ribavirin (Copegus®), Telaprevir (Incivo®) | USE CAUTION due to increased risk of ribavirin-induced hemolytic anemia | ITPA | WT/WT | Non-protective Wild Type |
| Infectious Diseases | ! | **Antiretroviral Drugs:** Atazanavir (Reyataz®) | USE CAUTION due to low likelihood of drug discontinuation resulted from jaundice | UGT1A1 | *1/*28 | Heterozygous *28 Allele Carrier |
| Infectious Diseases | ! | **Antiretroviral Drugs:** Lamivudine (Epivir®), Zidovudine(Retrovir®), Lopinavir/Ritonavir (Kaletra®) | USE CAUTION due to the increased risk of virological failure | ABCB1 | c.3435T>C/c.2677T>G | rs2032582 AC genotype/rs1045642 AG genotype |
| Infectious Diseases | ! | **Lipopeptides:** Daptomycin (Cubicin®) | USE CAUTION due to decreased drug response | ABCB1 | c.3435T>C/c.2677T>G | rs2032582 AC genotype/rs1045642 AG genotype |
| Infectious Diseases | ✓ | **Antifungal Drugs:** Voriconazole (Vfend®) | NORMAL RESPONSE EXPECTED | CYP2C19 | *1/*2 | Intermediate Metabolizer |
| Infectious Diseases | ✓ | **Antihepaciviral Drugs:** Ledipasvir/Sofosbuvir (Harvoni®) | NORMAL RESPONSE EXPECTED | IFNL3 | WT/WT | Favorable Response Genotype |
| Infectious Diseases | ✓ | **Antimalarial Drugs:** Chloroquine (Aralen®), Primaquine Phosphate (Primaquine®), Quinine (Qualaquin®) | NORMAL RESPONSE EXPECTED | G6PD | WT/WT | Normal G6PD Efficiency |
| Infectious Diseases | ✓ | **Antiretroviral Drugs:** Abacavir (Ziagen®) | NORMAL RESPONSE EXPECTED | HLA-B | WT/WT | Wild Type |
| Infectious Diseases | ✓ | **Antiretroviral Drugs:** Dolutegravir (Tivicay®) | NORMAL RESPONSE EXPECTED | UGT1A1 | *1/*28 | Heterozygous *28 Allele Carrier |
| Infectious Diseases | ✓ | **Antiretroviral Drugs:** Efavirenz (Sustiva®), Efavirenz/Emtricitabine/Tenofovir (Atripla®), Nevirapine (Viramune®) | NORMAL RESPONSE EXPECTED | CYP2B6 | *1/*1 | Non G516T Homozygous/Non A785G Homozygous/Non T983C Homozygous |
| Infectious Diseases | ✓ | **Antiretroviral Drugs:** Nelfinavir (Viracept®) | NORMAL RESPONSE EXPECTED | CYP2C19 | *1/*2 | Intermediate Metabolizer |
| Infectious Diseases | ✓ | **Antiretroviral Drugs:** Nevirapine (Viramune®) | NORMAL RESPONSE EXPECTED | ABCB1 | c.3435T>C/c.2677T>G | rs2032582 AC genotype/rs1045642 AG genotype |

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| Infectious Diseases | ✓ | **Antitubercular Agents:** Ethambutol (Myambutol®), Isoniazid, Pyrazinamide (Rifater®), Rifampin (Rifadin®) | NORMAL RESPONSE EXPECTED | NAT2 | *4/*4 | Rapid Acetylator |
| Infectious Diseases | ✓ | **Macrolides:** Erythromycin/Sulfisoxazole (Pediazole®) | NORMAL RESPONSE EXPECTED | G6PD | WT/WT | Normal G6PD Efficiency |
| Infectious Diseases | ✓ | **Miscellaneous Antibiotics:** Dapsone, Sulfamethoxazole/Trimethoprim (Bactrim®) | NORMAL RESPONSE EXPECTED | G6PD | WT/WT | Normal G6PD Efficiency |
| Infectious Diseases | ✓ | **Miscellaneous Antibiotics:** Nalidixic Acid (Neggram®), Nitrofurantoin (Macrobid®) | NORMAL RESPONSE EXPECTED | G6PD | WT/WT | Normal G6PD Efficiency |
| Infectious Diseases | ✓ | **Topical Antibiotics:** Mafenide (Sulfamylon®) | NORMAL RESPONSE EXPECTED | G6PD | WT/WT | Normal G6PD Efficiency |
| Neurology | ! | **Anticonvulsant Drugs:** Brivaracetam (Briviact®) | USE CAUTION due to possible increased ADRs caused by decreased drug clearance | CYP2C19 | *1/*2 | Intermediate Metabolizer |
| Neurology | ! | **Anticonvulsant Drugs:** Phenobarbital | USE CAUTION due to the increased risk of drug resistance | ABCB1 | c.3435T>C/c.2677T>G | rs2032582 AC genotype/rs1045642 AG genotype |
| Neurology | ! | **Antimigraine Agents:** Eletriptan (Relpax®), Zolmitriptan (Zomig®) | USE CAUTION due to the risk of increased exposure to the drug leading to adverse events | CYP3A4 | *1B/*1B | Poor Metabolizer |
| Neurology | ✓ | **Acetylcholinesterase Inhibitors:** Donepezil (Aricept®) | NORMAL RESPONSE EXPECTED | CYP2D6 | *10/*10 | Normal Metabolizer |
| Neurology | ✓ | **Acetylcholinesterase Inhibitors:** Galantamine (Razadyne®) | NORMAL RESPONSE EXPECTED | CYP2D6 | *10/*10 | Normal Metabolizer |
| Neurology | ✓ | **Anticonvulsant Drugs:** Carbamazepine (Tegretol®), Lamotrigine (Lamictal®), Oxcarbazepine (Trileptal®), Phenytoin (Dilantin®), Topiramate (Topamax®) | NORMAL RESPONSE EXPECTED | SCN2A | WT/WT | rs2304016 non-GG genotype |
| Neurology | ✓ | **Anticonvulsant Drugs:** Carbamazepine (Tegretol®), Phenytoin (Dilantin®) | NORMAL RESPONSE EXPECTED | HLA-B | WT/WT | Wild Type |

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| Neurology |  | **Anticonvulsant Drugs:** Clobazam (Onfi®) | **NORMAL RESPONSE EXPECTED** | CYP2C19 | *1/*2 | Intermediate Metabolizer |
| Neurology |  | **Central Monoamine-Depleting Agents:** Tetrabenazine (Xenazine®) | **NORMAL RESPONSE EXPECTED** | CYP2D6 | *10/*10 | Normal Metabolizer |
| Neurology |  | **COMT Inhibitors:** Entacapone (Comtan®) | **NORMAL RESPONSE EXPECTED** | COMT | WT/c.472G>A | Non MET Homozygous |
| Neurology |  | **NMDA Receptor Antagonists:** Dextromethorphan/Quinidine(Nuedexta®) | **NORMAL RESPONSE EXPECTED** | CYP2D6 | *10/*10 | Normal Metabolizer |
| Oncology |  | **VEGF Tyrosine Kinase Inhibitors:** Sunitinib (Sutent®) | **CONSIDER ALTERNATIVES**<br><br>OR<br><br>**DECREASE DOSE** | CYP3A4 | *1B/*1B | Poor Metabolizer |
| Oncology |  | **EGFR Tyrosine Kinase Inhibitors:** Ruxolitinib (Jakavi®) | **DECREASE DOSE** by 50% of the usual dose | CYP3A4 | *1B/*1B | Poor Metabolizer |
| Oncology |  | **Taxane Derivatives:** Cabazitaxel (Jevtana®) | **DECREASE DOSE** by 25% of the usual dose | CYP3A4 | *1B/*1B | Poor Metabolizer |
| Oncology |  | **Alkylating Agents:** Cyclophosphamide (Cytoxan®) | **USE CAUTION** due to poorer response and increased risk of toxicity | MTHFR | WT/C677T | C677T Heterozygous Mutation |
| Oncology |  | **Antiemetics (Selective 5-HT3 Receptor Antagonist):** Dolasetron (Anzemet®), Granisetron (Sancuso®) | **USE CAUTION** due to increased risk for QTc interval prolongation | NOS1AP | WT/c.106-38510G>T | rs10494366 GT genotype/rs10800397 C Allele Carrier/rs10919035 C Allele Carrier |
| Oncology |  | **Antiemetics (Selective 5-HT3 Receptor Antagonist):** Ondansetron (Zofran®) | **USE CAUTION** due to increased likelihood of nausea and vomiting | ABCB1 | c.3435T>C/c.2677T>G | rs2032582 AC genotype/rs1045642 AG genotype |

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| Oncology | ! | **Antimetabolites (Pyrimidine Analog):** Fluorouracil (Carac®) | **USE CAUTION** due to increased risk of diarrhea | ABCB1 | c.3435T>C/c.2677T>G | rs2032582 AC genotype/rs1045642 AG genotype |
| Oncology | ! | **Antimetabolites (Pyrimidine Analog):** Fluorouracil (Carac®) | **USE CAUTION** due to poorer response and increased risk of toxicity | MTHFR | WT/C677T | C677T Heterozygous Mutation |
| Oncology | ! | **Antimetabolites (Pyrimidine Analog):** Fluorouracil (Carac®) | **USE CAUTION** due to increased risk of severe neutropenia | XRCC1 | c.1196A>G/c.1196A>G | rs25487 C Allele Carrier |
| Oncology | ! | **Chemotherapy Modulating Agents:** Leucovorin (Wellcovorin®) | **USE CAUTION** due to poorer response and increased risk of toxicity | MTHFR | WT/C677T | C677T Heterozygous Mutation |
| Oncology | ! | **Chemotherapy Modulating Agents:** Leucovorin (Wellcovorin®) | **USE CAUTION** due to increased risk of severe neutropenia | XRCC1 | c.1196A>G/c.1196A>G | rs25487 C Allele Carrier |
| Oncology | ! | **EGFR Tyrosine Kinase Inhibitors:** Gefitinib (Iressa®) | **USE CAUTION** due to possible adverse reactions | CYP3A4 | *1B/*1B | Poor Metabolizer |
| Oncology | ! | **Folate Antimetabolites:** Methotrexate (Trexall®) | **USE CAUTION** due to increased risk of toxicity caused by increased drug concentration | ABCB1 | c.3435T>C/c.2677T>G | rs2032582 AC genotype/rs1045642 AG genotype |
| Oncology | ! | **Folate Antimetabolites:** Methotrexate (Trexall®), Pemetrexed (Alimta®) | **USE CAUTION** due to poorer response and increased risk of toxicity | MTHFR | WT/C677T | C677T Heterozygous Mutation |
| Oncology | ! | **Immunomodulators:** Thalidomide (Thalomid®) | **USE CAUTION** due to decreased overall survival | ERCC1 | c.*197G>T/c.*197G>T/c.354T>C/c.354T>C | rs3212986 AA genotype/rs11615 non-AA genotype/rs735482 AA genotype |
| Oncology | ! | **Platinum Analog:** Carboplatin (Paraplatin®), Cisplatin (Platinol®), Oxaliplatin (Eloxatin®) | **USE CAUTION** due to increased risk of severe neutropenia | XRCC1 | c.1196A>G/c.1196A>G | rs25487 C Allele Carrier |
| Oncology | ! | **Platinum Analog:** Carboplatin (Paraplatin®), Oxaliplatin (Eloxatin®) | **USE CAUTION** due to poorer response and increased risk of toxicity | MTHFR | WT/C677T | C677T Heterozygous Mutation |
| Oncology | ! | **Selective Estrogen Receptor Modulators (SERM):** Raloxifene (Evista®) | **USE CAUTION** due to decreased hip bone mineral density | UGT1A1 | *1/*28 | Heterozygous *28 Allele Carrier |
| Oncology | ! | **VEGF Tyrosine Kinase Inhibitors:** Sorafenib (NexAvar®) | **USE CAUTION** due to increased risk of Hyperbilirubinemia and treatment interruption | UGT1A1 | *1/*28 | Heterozygous *28 Allele Carrier |
| Oncology | ✓ | **Anthracyclines:** Doxorubicin (Doxil®) | **NORMAL RESPONSE EXPECTED** | ABCB1 | c.3435T>C/c.2677T>G | rs2032582 AC genotype/rs1045642 AG genotype |

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| Therapeutic | Action | Drug Impacted | Clinical Interpretation | Gene | Genotype | Phenotype |
|---|---|---|---|---|---|---|
| Oncology | ✓ | **Anthracyclines:** Doxorubicin (Doxil®), Epirubicin (Ellence®) | NORMAL RESPONSE EXPECTED | NQO1 | WT/WT | rs1800566 non-AA genotype |
| Oncology | ✓ | **Anthracyclines:** Epirubicin (Ellence®) | NORMAL RESPONSE EXPECTED | GSTP1 | WT/c.313A>G | rs1695 AG genotype |
| Oncology | ✓ | **Antiemetics:** Dexamethasone (Decadron®) | NORMAL RESPONSE EXPECTED | ABCB1 | c.3435T>C/c.2677T>G | rs2032582 AC genotype/rs1045642 AG genotype |
| Oncology | ✓ | **Antiemetics:** Dronabinol (Marinol®) | NORMAL RESPONSE EXPECTED | CYP2C9 | *1/*1 | Normal Metabolizer |
| Oncology | ✓ | **Antiemetics (Selective 5-HT3 Receptor Antagonist):** Palonosetron (Aloxi®) | NORMAL RESPONSE EXPECTED | CYP2D6 | *10/*10 | Normal Metabolizer |
| Oncology | ✓ | **Antimetabolites (Purine Analog):** Mercaptopurine (Purinethol®), Thioguanine (Tabloid®) | NORMAL RESPONSE EXPECTED | TPMT | *1/*1 | Normal Metabolizer |
| Oncology | ✓ | **Antimetabolites (Pyrimidine Analog):** Capecitabine (Xeloda®), Pyrimidinedione (Tegafur-Uracil®) | NORMAL RESPONSE EXPECTED | DPYD | *1/*5 | Normal Metabolizer |
| Oncology | ✓ | **Antimetabolites (Pyrimidine Analog):** Cytarabine (Depocyt®) | NORMAL RESPONSE EXPECTED | CDA | WT/WT | rs532545 C Allele |
| Oncology | ✓ | **BCR-ABL Tyrosine Kinase Inhibitors:** Nilotinib (Tasigna®), Pazopanib (Votrient®) | NORMAL RESPONSE EXPECTED | UGT1A1 | *1/*28 | Heterozygous *28 Allele Carrier |
| Oncology | ✓ | **BRAF Kinase Inhibitors:** Dabrafenib (Tafinlar®) | NORMAL RESPONSE EXPECTED | G6PD | WT/WT | Normal G6PD Efficiency |
| Oncology | ✓ | **EGFR Tyrosine Kinase Inhibitors:** Erlotinib (Tarceva®) | NORMAL RESPONSE EXPECTED | UGT1A1 | *1/*28 | Heterozygous *28 Allele Carrier |
| Oncology | ✓ | **Histone Deacetylase (HDAC) Inhibitors:** Belinostat (Beleodaq®) | NORMAL RESPONSE EXPECTED | UGT1A1 | *1/*28 | Heterozygous *28 Allele Carrier |

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| Oncology | ✓ | **Selective Estrogen Receptor Modulators (SERM):** Tamoxifen (Soltamox®) | NORMAL RESPONSE EXPECTED | CYP2D6 | *10/*10 | Normal Metabolizer |
| Oncology | ✓ | **Selective Estrogen Receptor Modulators (SERM):** Tamoxifen (Soltamox®) | NORMAL RESPONSE EXPECTED | F2 | WT/WT | Wild Type |
| Oncology | ✓ | **Taxane Derivatives:** Docetaxel (Taxotere®) | NORMAL RESPONSE EXPECTED | ERCC1 | c.*197G>T/c.*197G>T/c.354T>C/c.354T>C | rs3212986 AA genotype/rs11615 non-AA genotype/rs735482 AA genotype |
| Oncology | ✓ | **Taxane Derivatives:** Paclitaxel (Abraxane®) | NORMAL RESPONSE EXPECTED | ABCB1 | c.3435T>C/c.2677T>G | rs2032582 AC genotype/rs1045642 AG genotype |
| Oncology | ✓ | **Taxane Derivatives:** Paclitaxel (Abraxane®) | NORMAL RESPONSE EXPECTED | ERCC1 | c.*197G>T/c.*197G>T/c.354T>C/c.354T>C | rs3212986 AA genotype/rs11615 non-AA genotype/rs735482 AA genotype |
| Oncology | ✓ | **Topoisomerase I Inhibitors:** Irinotecan (Camptosar®) | NORMAL RESPONSE EXPECTED | UGT1A1 | *1/*28 | Heterozygous *28 Allele Carrier |
| Oncology | ✓ | **Topoisomerase II Inhibitor:** Idarubicin (Idamycin®) | NORMAL RESPONSE EXPECTED | SLCO1B1 | *1/*1 | Normal Activity |
| Oncology | ✓ | **Urate-Oxidases (Recombinant):** Rasburicase (Elitek®) | NORMAL RESPONSE EXPECTED | G6PD | WT/WT | Normal G6PD Efficiency |
| Oncology | ✓ | **Vinca Alkaloids:** Vincristine (Marqibo®) | NORMAL RESPONSE EXPECTED | ABCB1 | c.3435T>C/c.2677T>G | rs2032582 AC genotype/rs1045642 AG genotype |
| Ophthalmology | ✓ | **Nonsteroidal Anti-inflammatory Drugs (NSAIDs):** Flurbiprofen (Ocufen®) | NORMAL RESPONSE EXPECTED | CYP2C9 | *1/*1 | Normal Metabolizer |
| Pain Management | ▼ | **Opioids:** Methadone (Methadose®) | DECREASE DOSE | DRD2 | WT/c.-585A>G | rs1799978 C allele Carrier |

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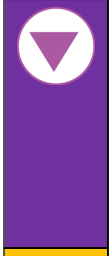
|---|---|---|---|---|---|---|
| Pain Management |  | **Opioids:** Buprenorphine (Subutex®), Fentanyl (Duragesic®), Hydrocodone/Acetaminophen (Vicodin®), Oxycodone (Oxycontin®), Sufentanil (Sufenta®) | **DECREASE DOSE**<br><br>OR<br><br>**USE CAUTION** due to the risk of increased exposure to the drug leading to adverse events | CYP3A4 | *1B/*1B | Poor Metabolizer |
| Pain Management |  | **Skeletal Muscle Relaxants:** Cyclobenzaprine (Flexeril®) | **INCREASE DOSE**<br><br>OR<br><br>**USE CAUTION** due to the risk of decreased exposure to the drug leading to lower effectiveness | CYP1A2 | *1F/*1F | Ultrarapid Metabolizer |
| Pain Management |  | **Alpha-2 Adrenergic Agonists:** Tizanidine (Zanaflex®) | **USE CAUTION** due to the increased risk for loss of efficacy | CYP1A2 | *1F/*1F | Ultrarapid Metabolizer |
| Pain Management |  | **Nonsteroidal Anti-inflammatory Drugs (NSAIDs):** Celecoxib (Celebrex®), Diclofenac (Voltaren®), Meloxicam (Mobic®) | **NORMAL RESPONSE EXPECTED** | CYP2C9 | *1/*1 | Normal Metabolizer |
| Pain Management |  | **Nonsteroidal Anti-inflammatory Drugs (NSAIDs):** Ibuprofen (Advil®), Naproxen (Aleve®) | **NORMAL RESPONSE EXPECTED** | CYP2C9 | *1/*1 | Normal Metabolizer |
| Pain Management |  | **Nonsteroidal Anti-inflammatory Drugs (NSAIDs):** Piroxicam (Feldene®) | **NORMAL RESPONSE EXPECTED** | CYP2C9 | *1/*1 | Normal Metabolizer |
| Pain Management |  | **Opioids:** Alfentanil (Alfenta®), Hydromorphone (Dilaudid®), Morphine (MS Contin®), Morphine/Naltrexone (Embeda®) | **NORMAL RESPONSE EXPECTED** | OPRM1 | WT/c.290+1050C>T | rs1799971 A Allele Carrier/rs510679 non-TT genotype |
| Pain Management |  | **Opioids:** Codeine (Codeine®), Codeine/Acetaminophen (Tylenol®) | **NORMAL RESPONSE EXPECTED** | CYP2D6 | *10/*10 | Normal Metabolizer |

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|---|---|---|---|---|---|---|
| Pain Management |  | **Opioids:** Tramadol hydrochloride/Acetaminophen (Ultracet®), Tramadol (Ultram®) | NORMAL RESPONSE EXPECTED | CYP2D6 | *10/*10 | Normal Metabolizer |
| Pain Management |  | **Skeletal Muscle Relaxants:** Carisoprodol (Soma®) | NORMAL RESPONSE EXPECTED | CYP2C19 | *1/*2 | Intermediate Metabolizer |
| Psychiatry |  | **Benzodiazepines:** Alprazolam (Xanax®) | CONSIDER ALTERNATIVES | CYP3A4 | *1B/*1B | Poor Metabolizer |
| Psychiatry |  | **Antipsychotics:** Aripiprazole (Abilify®) | DECREASE DOSE by 50% of the usual dose | CYP3A4 | *1B/*1B | Poor Metabolizer |
| Psychiatry |  | **Selective Serotonin Reuptake Inhibitors (SSRIs):** Vilazodone (Viibryd®) | DECREASE DOSE by 50% | CYP3A4 | *1B/*1B | Poor Metabolizer |
| Psychiatry |  | **Serotonin and Norepinephrine Reuptake Inhibitors (SNRIs):** Levomilnacipran (Fetzima®) | DECREASE DOSE to less than 80mg daily | CYP3A4 | *1B/*1B | Poor Metabolizer |
| Psychiatry |  | **Antimanic Agents:** Lithium (Lithobid®) | USE CAUTION due to increased risk of suicidal ideation | ABCB1 | c.3435T>C/c.2677T>G | rs2032582 AC genotype/rs1045642 AG genotype |
| Psychiatry |  | **Antipsychotics:** Chlorpromazine, Fluphenazine | USE CAUTION due to decreased QT interval | CYP1A2 | *1F/*1F | Ultrarapid Metabolizer |
| Psychiatry |  | **Antipsychotics:** Olanzapine (Zalasta®), Quetiapine (Seroquel®), Risperidone (Risperdal®) | USE CAUTION due to increased risk of side effects | SLC6A4 | S/LA | HTTLPR Long Form |
| Psychiatry |  | **Antipsychotics:** Risperidone (Risperdal®) | USE CAUTION due to reduced symptoms improvement and increased risk of Hyperprolactinemia | DRD2 | WT/c.-585A>G | rs1799978 C allele Carrier |
| Psychiatry |  | **Benzodiazepines:** Diazepam (Valium®) | USE CAUTION due to possible increased ADRs caused by decreased drug metabolism | CYP2C19 | *1/*2 | Intermediate Metabolizer |
| Psychiatry |  | **Benzodiazepines:** Lorazepam (Ativan®), Oxazepam (Serax®) | USE CAUTION due to increased risk of side effects caused by decreased clearance of drug | UGT2B15 | *1/*1 | rs1902023 AA genotype |
| Psychiatry |  | **Other Stimulants:** Cannabinoids | USE CAUTION due to increased risk of tetrahydrocannabinol (THC) dependence | FAAH | WT/WT | rs324420 CC genotype |

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| Psychiatry | ⚠ | **Selective Serotonin Reuptake Inhibitors (SSRIs):** Sertraline (Zoloft®) | **USE CAUTION** with high alert to adverse drug events | CYP2C19 | *1/*2 | Intermediate Metabolizer |
| Psychiatry | ⚠ | **Serotonin and Norepinephrine Reuptake Inhibitors (SNRIs):** Milnacipran (Savella®) | **USE CAUTION** due to reduced response | ADRA2A | WT/WT | rs1800544 GG genotype/rs1800545 GG genotype |
| Psychiatry | ⚠ | **Serotonin and Norepinephrine Reuptake Inhibitors (SNRIs):** Reboxetine (Edronax®), Trazodone (Desyrel®) | **USE CAUTION** be alert to ADEs and make necessary dose adjustments | CYP3A4 | *1B/*1B | Poor Metabolizer |
| Psychiatry | ✓ | **Aldehyde Dehydrogenase Inhibitors:** Disulfiram (Antabuse®) | **NORMAL RESPONSE EXPECTED** | ANKK1 | WT/WT | Non A1 Carrier |
| Psychiatry | ✓ | **Alpha-2 Antagonists:** Mirtazapine (Remeron®) | **NORMAL RESPONSE EXPECTED** | CYP2D6 | *10/*10 | Normal Metabolizer |
| Psychiatry | ✓ | **Anti-Anxiety Agents:** Buspirone (Buspar®) | **NORMAL RESPONSE EXPECTED** | HTR1A | c.-1019G>C/c.-1019G>C | rs6295 non-CC genotype/rs1800044 C Allele Carrier |
| Psychiatry | ✓ | **Antipsychotics:** Brexpiprazole (Rexulti®), Iloperidone (Fanapt®), Pimozide (Orap®) | **NORMAL RESPONSE EXPECTED** | CYP2D6 | *10/*10 | Normal Metabolizer |
| Psychiatry | ✓ | **Antipsychotics:** Clozapine (Clozaril®) | **NORMAL RESPONSE EXPECTED** | CYP2D6 | *10/*10 | Normal Metabolizer |
| Psychiatry | ✓ | **Antipsychotics:** Clozapine (Clozaril®), Olanzapine (Zyprexa®) | **NORMAL RESPONSE EXPECTED** | ANKK1 | WT/WT | Non A1 Carrier |
| Psychiatry | ✓ | **Antipsychotics:** Clozapine (Clozaril®), Olanzapine (Zyprexa®) | **NORMAL RESPONSE EXPECTED** | HTR2C | c.551-3008C>G/c.551-3008C>G | rs1414334 G Allele Carrier |
| Psychiatry | ✓ | **Antipsychotics:** Haloperidol (Haldol®) | **NORMAL RESPONSE EXPECTED** | CYP2D6 | *10/*10 | Normal Metabolizer |
| Psychiatry | ✓ | **Antipsychotics:** Olanzapine (Zyprexa®) | **NORMAL RESPONSE EXPECTED** | CYP1A2 | *1F/*1F | Ultrarapid Metabolizer |
| Psychiatry | ✓ | **Antipsychotics:** Perphenazine | **NORMAL RESPONSE EXPECTED** | CYP2D6 | *10/*10 | Normal Metabolizer |

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| Psychiatry | ✓ | **Antipsychotics:** Thioridazine (Mellaril®) | NORMAL RESPONSE EXPECTED | CYP2D6 | *10/*10 | Normal Metabolizer |
| Psychiatry | ✓ | **Antipsychotics:** Valproic acid (Depakote®) | NORMAL RESPONSE EXPECTED | ANKK1 | WT/WT | Non A1 Carrier |
| Psychiatry | ✓ | **Benzodiazepines:** Midazolam (Versed®) | NORMAL RESPONSE EXPECTED | CYP3A5 | *1A/*1A | High Expresser |
| Psychiatry | ✓ | **CNS Stimulants (ADHD):** Amphetamine (Adderall®) | NORMAL RESPONSE EXPECTED | OPRM1 | WT/c.290+1050C>T | rs1799971 A Allele Carrier/rs510679 non-TT genotype |
| Psychiatry | ✓ | **CNS Stimulants (ADHD):** Amphetamine (Adderall®), Dexmethylphenidate (Focalin®), Dextroamphetamine (Adderall®), Lisdexamfetamine (Vyvanse®), Methylphenidate (Ritalin®) | NORMAL RESPONSE EXPECTED | COMT | WT/c.472G>A | Non MET Homozygous |
| Psychiatry | ✓ | **CNS Stimulants (ADHD):** Dextroamphetamine (Adderall®), Methylphenidate (Ritalin®) | NORMAL RESPONSE EXPECTED | DRD1 | c.-48G>A/c.-48G>A | rs4532 non-CC genotype |
| Psychiatry | ✓ | **CNS Stimulants (ADHD):** Methamphetamine (Desoxyn®) | NORMAL RESPONSE EXPECTED | FAAH | WT/WT | rs324420 CC genotype |
| Psychiatry | ✓ | **CNS Stimulants (ADHD):** Methylphenidate (Ritalin®) | NORMAL RESPONSE EXPECTED | CES1 | WT/WT | rs71647871 C Allele |
| Psychiatry | ✓ | **Opioids Antagonists:** Naloxone (Evzio®), Naltrexone (Revia®) | NORMAL RESPONSE EXPECTED | OPRM1 | WT/c.290+1050C>T | rs1799971 A Allele Carrier/rs510679 non-TT genotype |
| Psychiatry | ✓ | **Other Stimulants:** Cocaine | NORMAL RESPONSE EXPECTED | CNR1 | WT/c.*3475A>G | rs806368 non-TT genotype |

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|---|---|---|---|---|---|---|
| Psychiatry | ✓ | **Selective Serotonin Reuptake Inhibitors (SSRIs):** Citalopram (Celexa®) | NORMAL RESPONSE EXPECTED | GRIK4 | WT/c.83-10039T>C | rs1954787 TC genotype |
| Psychiatry | ✓ | **Selective Serotonin Reuptake Inhibitors (SSRIs):** Citalopram (Celexa®) | NORMAL RESPONSE EXPECTED | HTR2A | WT/c.614-2211T>C | rs7997012 non-GG genotype |
| Psychiatry | ✓ | **Selective Serotonin Reuptake Inhibitors (SSRIs):** Citalopram (Celexa®), Escitalopram (Lexapro®) | NORMAL RESPONSE EXPECTED | CYP2C19 | *1/*2 | Intermediate Metabolizer |
| Psychiatry | ✓ | **Selective Serotonin Reuptake Inhibitors (SSRIs):** Citalopram (Celexa®), Escitalopram (Lexapro®) | NORMAL RESPONSE EXPECTED | SLC6A4 | S/LA | HTTLPR Long Form |
| Psychiatry | ✓ | **Selective Serotonin Reuptake Inhibitors (SSRIs):** Fluoxetine (Prozac®) | NORMAL RESPONSE EXPECTED | CYP2D6 | *10/*10 | Normal Metabolizer |
| Psychiatry | ✓ | **Selective Serotonin Reuptake Inhibitors (SSRIs):** Fluvoxamine (Luvox®) | NORMAL RESPONSE EXPECTED | CYP2D6 | *10/*10 | Normal Metabolizer |
| Psychiatry | ✓ | **Selective Serotonin Reuptake Inhibitors (SSRIs):** Fluvoxamine (Luvox®), Paroxetine (Paxil®) | NORMAL RESPONSE EXPECTED | HTR1A | c.-1019G>C/c.-1019G>C | rs6295 non-CC genotype/rs1800044 C Allele Carrier |
| Psychiatry | ✓ | **Selective Serotonin Reuptake Inhibitors (SSRIs):** Paroxetine (Paxil®) | NORMAL RESPONSE EXPECTED | CYP2D6 | *10/*10 | Normal Metabolizer |
| Psychiatry | ✓ | **Selective Serotonin Reuptake Inhibitors (SSRIs):** Vortioxetine (Trintellix®) | NORMAL RESPONSE EXPECTED | CYP2D6 | *10/*10 | Normal Metabolizer |
| Psychiatry | ✓ | **Serotonin and Norepinephrine Reuptake Inhibitors (SNRIs):** Atomoxetine (Strattera®) | NORMAL RESPONSE EXPECTED | CYP2D6 | *10/*10 | Normal Metabolizer |
| Psychiatry | ✓ | **Serotonin and Norepinephrine Reuptake Inhibitors (SNRIs):** Duloxetine (Cymbalta®) | NORMAL RESPONSE EXPECTED | CYP1A2 | *1F/*1F | Ultrarapid Metabolizer |
| Psychiatry | ✓ | **Serotonin and Norepinephrine Reuptake Inhibitors (SNRIs):** Venlafaxine (Effexor®) | NORMAL RESPONSE EXPECTED | CYP2D6 | *10/*10 | Normal Metabolizer |

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| Psychiatry | ✓ | **Tetracyclic Antidepressants:** Maprotiline | NORMAL RESPONSE EXPECTED | CYP2D6 | *10/*10 | Normal Metabolizer |
| Psychiatry | ✓ | **Tricyclic Antidepressants:** Amitriptyline (Elavil®), Clomipramine (Anafranil®), Desipramine (Norpramin®), Doxepin (Silenor®), Imipramine (Tofranil®), Nortriptyline (Pamelor®), Protriptyline (Vivactil®), Trimipramine (Surmontil®) | NORMAL RESPONSE EXPECTED | CYP2C19 | *1/*2 | Intermediate Metabolizer |
| Psychiatry | ✓ | **Tricyclic Antidepressants:** Amitriptyline (Elavil®), Clomipramine (Anafranil®), Desipramine (Norpramin®), Doxepin (Silenor®), Imipramine (Tofranil®), Nortriptyline (Pamelor®), Protriptyline (Vivactil®), Trimipramine (Surmontil®) | NORMAL RESPONSE EXPECTED | CYP2D6 | *10/*10 | Normal Metabolizer |
| Smoking Cessation | ✓ | **Smoking Cessation Aids:** Bupropion (Zyban®) | NORMAL RESPONSE EXPECTED | ANKK1 | WT/WT | Non A1 Carrier |
| Smoking Cessation | ✓ | **Smoking Cessation Aids:** Nicotine (Nicoderm®) | NORMAL RESPONSE EXPECTED | COMT | WT/c.472G>A | Non MET Homozygous |
| Supplements | ✗ | **Vitamins:** Folic Acid | CONSIDER ALTERNATIVES (e.g., supplements containing methylfolate) due to reduced folic acid conversion | MTHFR | WT/C677T | C677T Heterozygous Mutation |
| Toxicology | ✓ | **Antidotes:** Ethanol | NORMAL RESPONSE EXPECTED | ANKK1 | WT/WT | Non A1 Carrier |
| Toxicology | ✓ | **Antidotes:** Ethanol | NORMAL RESPONSE EXPECTED | OPRM1 | WT/c.290+1050C>T | rs1799971 A Allele Carrier/rs510679 non-TT genotype |
| Toxicology | ✓ | **Antidotes:** Methylene Blue (Provayblue®) | NORMAL RESPONSE EXPECTED | G6PD | WT/WT | Normal G6PD Efficiency |
| Toxicology | ✓ | **Antidotes:** Sodium Nitrite | NORMAL RESPONSE EXPECTED | G6PD | WT/WT | Normal G6PD Efficiency |

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| Urology |  | **Alpha 1 Blockers:** Silodosin (Rapaflo®) | **CONSIDER ALTERNATIVES** | CYP3A4 | *1B/*1B | Poor Metabolizer |
| Urology |  | **Alpha 1 Blockers:** Dutasteride/Tamsulosin (Jalyn®), Tamsulosin (Flomax®) | **NORMAL RESPONSE EXPECTED** | CYP2D6 | *10/*10 | Normal Metabolizer |
| Urology |  | **Anticholinergic Agents:** Darifenacin (Enablex®), Fesoterodine (Toviaz®) | **NORMAL RESPONSE EXPECTED** | CYP2D6 | *10/*10 | Normal Metabolizer |
| Urology |  | **Anticholinergic Agents:** Tolterodine (Detrol®) | **NORMAL RESPONSE EXPECTED** | CYP2D6 | *10/*10 | Normal Metabolizer |

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# Patient PGxOne™ Plus Genotype and Phenotype Results for Wong, Eric

PGxOne™ Plus

| Gene | Genotype | Phenotype |
|---|---|---|
| ABCB1 | c.3435T>C/c.2677T>G | rs2032582 AC genotype/rs1045642 AG genotype |
| ACE | WT/WT | ACE Deletion |
| ADRA2A | WT/WT | rs1800544 GG genotype/rs1800545 GG genotype |
| AGTR1 | WT/WT | rs5186 AA genotype |
| ANKK1 | WT/WT | Non A1 Carrier |
| APOE | WT/WT | Non E2 Carrier |
| ATM | WT/c.175-5285G>T | rs11212617 AC genotype |
| CDA | WT/WT | rs532545 C Allele |
| CES1 | WT/WT | rs71647871 C Allele |
| CNR1 | WT/c.*3475A>G | rs806368 non-TT genotype |
| COMT | WT/c.472G>A | Non MET Homozygous |
| CYP1A2 | *1F/*1F | Ultrarapid Metabolizer |
| CYP2B6 | *1/*1 | Non G516T Homozygous/Non A785G Homozygous/Non T983C Homozygous |
| CYP2C19 | *1/*2 | Intermediate Metabolizer |
| CYP2C8 | *1/*1 | Wild Type |
| CYP2C9 | *1/*1 | Normal Metabolizer |
| CYP2D6 | *10/*10 | Normal Metabolizer |
| CYP3A4 | *1B/*1B | Poor Metabolizer |
| CYP3A5 | *1A/*1A | High Expresser |
| CYP4F2 | *1/*3 | Intermediate Metabolizer |
| DPYD | *1/*5 | Normal Metabolizer |
| DRD1 | c.-48G>A/c.-48G>A | rs4532 non-CC genotype |
| DRD2 | WT/c.-585A>G | rs1799978 C allele Carrier |
| ERCC1 | c.*197G>T/c.*197G>T/c.354T>C/c.354T>C | rs3212986 AA genotype/rs11615 non-AA genotype/rs735482 AA genotype |
| F2 | WT/WT | Wild Type |

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| Gene | Genotype | Phenotype |
|---|---|---|
| F5 | WT/WT | Non Factor V Leiden Carrier |
| FAAH | WT/WT | rs324420 CC genotype |
| G6PD | WT/WT | Normal G6PD Efficiency |
| GRIK4 | WT/c.83-10039T>C | rs1954787 TC genotype |
| GSTP1 | WT/c.313A>G | rs1695 AG genotype |
| HLA-B | WT/WT | Wild Type |
| HTR1A | c.-1019G>C/c.-1019G>C | rs6295 non-CC genotype/rs1800044 C Allele Carrier |
| HTR2A | WT/c.614-2211T>C | rs7997012 non-GG genotype |
| HTR2C | c.551-3008C>G/c.551-3008C>G | rs1414334 G Allele Carrier |
| IFNL3 | WT/WT | Favorable Response Genotype |
| ITPA | WT/WT | Non-protective Wild Type |
| KIF6 | c.2155T>C/c.2155T>C | rs20455 non-AA genotype |
| MTHFR | WT/C677T | C677T Heterozygous Mutation |
| NAT2 | *4/*4 | Rapid Acetylator |
| NOS1AP | WT/c.106-38510G>T | rs10494366 GT genotype/rs10800397 C Allele Carrier/rs10919035 C Allele Carrier |
| NQO1 | WT/WT | rs1800566 non-AA genotype |
| OPRM1 | WT/c.290+1050C>T | rs1799971 A Allele Carrier/rs510679 non-TT genotype |
| SCN2A | WT/WT | rs2304016 non-GG genotype |
| SLC6A4 | S/LA | HTTLPR Long Form |
| SLCO1B1 | *1/*1 | Normal Activity |
| TPMT | *1/*1 | Normal Metabolizer |
| UGT1A1 | *1/*28 | Heterozygous *28 Allele Carrier |
| UGT2B15 | *1/*1 | rs1902023 AA genotype |
| VKORC1 | -1639G>A/-1639G>A | rs9923231 A Allele Carrier |
| XRCC1 | c.1196A>G/c.1196A>G | rs25487 C Allele Carrier |

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## PGxOne™ Plus Panel Genes and Variants:

This test only detects those genes and variants listed below. A normal (wild type) genotype signifies the absence of the targeted alleles and does not indicate the absence of other mutations not covered by the assay. The possibility cannot be ruled out that the indicated genotypes may be present but below the limits of detection for this assay. The panel includes 50 genes and 211 variants based on the recommendations of the Clinical Pharmacogenetics Implementation Consortium (CPIC) and Dutch Pharmacogenetics Working Group (DPWG) and the FDA's work group guidance.

| Gene | Allele Type | Alleles |
|---|---|---|
| ABCB1 | Decreased Activity | rs1045642, rs2032582 |
| ACE | Decreased Activity | rs1799752 |
| ADRA2A | Decreased Activity | rs1800544, rs1800545 |
| AGTR1 | Decreased Activity | rs5186 |
| ANKK1 | Decreased Activity | rs1800497 |
| APOE | Decreased Activity | rs7412 |
| ATM | Decreased Metformin Response | rs11212617 |
| CDA | Decreased Activity | rs532545 |
| CES1 | Decreased Activity | rs71647871 |
| CNR1 | Decreased Activity | rs806368 |
| COMT | Decreased Activity | rs4680 |
| CYP1A2 | Active | *1A |
| | Increased Activity | *1F |
| | Decreased Activity | *1C, *1K, *3, *4, *7 |
| | Inactive | *6 |
| CYP2B6 | Decreased Activity | *6, *18 |
| CYP2C19 | Active | *1 |
| | Increased Activity | *17 |
| | Decreased Activity | *9, *10 |
| | Inactive | *2, *3, *4, *5, *6, *7, *8, *12 |
| CYP2C8 | Decreased Activity | *3 |
| CYP2C9 | Active | *1 |
| | Decreased Activity | *2, *3, *4, *5, *8, *9, *11, *12, *13, *14, *16 |
| | Inactive | *6, *15 |
| CYP2D6 | Active | *1, *2, *35 |
| | Decreased Activity | *9, *10, *17, *29, *41 |
| | Inactive | *3, *4, *6, *7, *8, *11, *12, *14, *19, *20, *21, *38, *40, *44 |
| | Deletion | *5 |
| | Amplification | *1XN, *2XN, *4XN, *10XN, *17XN, *29xN, *35xN, *41XN |
| CYP3A4 | Active | *1A |
| | Decreased Activity | *1B, *2, *3, *12, *17 |
| CYP3A5 | Active | *1A |
| | Decreased Activity | *2, *7, *8, *9 |
| | Inactive | *3A, *3B, *6 |

| | | |
|---|---|---|
| CYP4F2 | Active | *1 |
| | Decreased Activity | *3 |
| DPYD | Active | *1, *4, *5, *6, *9A |
| | Decreased Activity | *9B, *10 |
| | Inactive | *2A, *3, *7, *8, *11, *12, *13, 496A>G, IVS10-15T>C, 1845G>T, 2846A>T |
| DRD1 | Decreased Activity | rs4532 |
| DRD2 | Decreased Activity | rs1799978 |
| ERCC1 | Decreased Activity | rs3212986, rs11615, rs735482 |
| F2 | Prothrombin Mutation | G20210A |
| F5 | Increased Activity | rs6025 |
| FAAH | Decreased Activity | rs324420 |
| G6PD | Decreased Activity | A, A-202A_376G, A-376G_968C, Alhambra, Andalus, Beverly Hills, Canton, Cassano, Chatham, Chinese-3, Chinese-4, Coimbra, Cosenza, Fushan, Guadalajara, Ilesha, Iowa, Kaiping, Kalyan, Lagosanto, Mahidol, Mediterranean, Metaponto, Minnesota, Mt. Sinai, Nara, Nashville, Olomouc, Pawnee, Plymouth, Praba, Puetro Limon, Santamaria, Santiago, Santiago de Cuba, Sao Boria, Shinshu, Sibari, Telti, Tomah, Ube, Union, Viangchan, West Virginia |
| GRIK4 | Decreased Activity | rs1954787 |
| GSTP1 | Decreased Activity | rs1695 |
| HLA-B | Carbamazepine ADR | *1502 |
| | Abacavir Hypersensitivity | *5701 |
| | Allopurinol ADR | *5801 |
| HTR1A | Decreased Activity | rs1800044, rs6295 |
| HTR2A | Decreased Activity | rs7997012 |
| HTR2C | Decreased Activity | rs1414334, rs3813929 |
| IFNL3 | Decreased Activity | rs12979860, rs8099917 |
| ITPA | Decreased Activity | rs1127354, rs7270101 |
| KIF6 | Decreased Activity | rs20455 |
| MTHFR | Decreased Activity | C677T, A1298C |
| NAT2 | Active | *4, *12, *13 |
| | Inactive | *5, *6, *7 |
| NOS1AP | Decreased Activity | rs10494366, rs10800397, rs10919035 |
| NQO1 | Decreased Activity | rs1800566 |
| OPRM1 | Decreased Activity | rs1799971, rs510769 |
| SCN2A | Decreased Activity | rs2304016 |
| SLC6A4 | Decreased Activity | 5-HTTLPR $L_A$, 5-HTTLPR $L_G$, 5-HTTLPR S |
| SLCO1B1 | Decreased Activity | *5 |
| TPMT | Active | *1 |
| | Inactive | *2, *3A, *3B, *3C, *4 |
| UGT1A1 | Decreased Activity | *28 |
| UGT2B15 | Decreased Activity | rs1902023 |
| VKORC1 | Increased Warfarin Sensitivity | -1639G>A |
| XRCC1 | Decreased Activity | rs25487 |

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## Assay Methodology and Limitations for PGxOne™ Plus Panel:

*Pharmacogenomics testing to assess how a patient may respond to prescribed drugs was performed by massively parallel Next Generation Sequencing (NGS). PGxOne™ Plus was developed, and assessed for accuracy and precision by Admera Health, South Plainfield NJ. The sensitivity and specificity of this test is 100% and 100% respectively. PGxOne™ Plus has not been cleared or approved by the U.S. Food and Drug Administration (FDA) but the FDA has determined that such clearance or approval is not necessary. The PGxOne™ Plus test is used for clinical purposes. It should not be regarded as investigational or for research. Drug interaction information is based upon data available in scientific literature and prescribing information for the most commonly prescribed drugs. This laboratory is certified under the Clinical Laboratory Improvement Amendments (CLIA) as qualified to perform high complexity clinical laboratory testing. The DNA testing is not a substitute for clinical monitoring.*

## General Pharmacogenomics References:

1. Drug labels with pharmacogenomics information:
   https://www.pharmgkb.org/view/drug-labels.do

2. Pharmacogenomics drug dosing guidelines:
   https://www.pharmgkb.org/view/dosing-guidelines.do

3. FDA Orange Book Search Engine:
   http://www.accessdata.fda.gov/scripts/cder/ob/default.cfm

4. Warfarin dosing guideline:
   Clinical Pharmacogenetics Implementation Consortium Guidelines
   for CYP2C9 and VKORC1 Genotypes and Warfarin Dosing



**Electronic Signature**

Laboratory Director
ABMG Certified, Clinical Molecular Genetics