PGX TESTING

PATIENT: Doe, Jane
GENDER: F DOB: 06/02/1973
ACCESSION: PTD-00020
REPORTED: 02/11/2016
SPECIMEN: Buccal Swab

FACILITY: Personal Genome
PHYSICIAN: System Check
COLLECTED: 02/10/2016
RECEIVED: 02/11/2016
SIGNED: San San Ng, Ph.D.

CURRENT PATIENT MEDICATIONS

Drug summary for prescribed medications.

acetaminophen-oxycodone (Roxicet), atorvastatin (Lipitor), clopidogrel (Plavix), diltiazem (Cardizem), warfarin (Coumadin)

REPORT LEGEND

✔ (Low/No Genetic Impact) Indicates that there were no genetic issues of clinical relevance that were found with the medication and the particular gene(s)tested. Standard precautions are recommended.

! (Moderate Genetic Impact) Indicates that extra caution should be observed because of genetic issues of clinical relevance that were found with the medication and the particular gene(s) tested.

✖ (High Genetic Impact) Indicates that extreme caution or avoidance should be considered because serious genetic issues of clinical relevance were found with the medication and the particular gene(s) tested.

GENETIC DRUG INTERACTIONS

Medications affected by the patient's genetic results that are currently prescribed.

✖ **acetaminophen-oxycodone (Roxicet)** - CYP1A2 [*1F/*1F]
The patient is an ultra rapid metabolizer and may have decreased response to therapy due to increased metabolization of drugs.
Analysis: Acetaminophen is metabolized by CYP1A2. Ultra rapid metabolizers of CYP1A2 may be more vulnerable to liver damage due to toxicity of NAPQI metabolite.

! **atorvastatin (Lipitor)** - CYP3A4 [*1/*3]
Intermediate (lower than normal) CYP3A4 metabolism is anticipated. This phenotype consists of one inactive CYP3A4 allele and one active CYP3A4 allele. It is suggested that intermediate metabolizers be administered CYP3A4 metabolized drugs at a reduced dosage. In addition, please consult drug labeling for further dosing guidelines.
Analysis: Atorvastatin levels may increase in CYP3A4 intermediate metabolizers. It is suggested that intermediate metabolizers be administered CYP3A4 metabolized drugs at a reduced dosage.

! **clopidogrel (Plavix)** - CYP2C19 [*1/*17]
The patient is an ultra rapid metabolizer (URM). This phenotype consists of two increased activity CYP2C19 alleles. CYP2C19 URMs have markedly elevated levels of enzyme activity. For prodrugs that require activation, URMs readily convert the drug into its active metabolite. Thus, URMs may be at an increased risk of elevated exposure to the active drug metabolites and may require lower than standard dosage of prodrug. For parent (active) drugs that do not require activation, it is suggested that URMs be administered CYP2C19 metabolized drugs at an increased dosage.
Analysis: Patient is an ultra-rapid metabolizer (rapid activator) of clopidogrel. Patient readily converts clopidogrel to its active metabolite at very elevated rates. Pharmacological effects of the drug should be monitored closely. Ultra-rapid metabolizers may be at an increased bleeding risk. Depending on other health factors, consider alternate therapy such as prasugrel (Effient), ticagrelor (Brilinta) or aspirin-dipyridamole (Aggrenox), depending on the indication for an antiplatelet agent.

! **diltiazem (Cardizem)** - CYP3A4 [*1/*3]
Intermediate (lower than normal) CYP3A4 metabolism is anticipated. This phenotype consists of one inactive CYP3A4 allele and one active CYP3A4 allele. It is suggested that intermediate metabolizers be administered CYP3A4 metabolized drugs at a reduced dosage. In addition, please consult drug labeling for further dosing guidelines.

! **warfarin (Coumadin)** - VKORC1 [G/A]
This patient has intermediate sensitivity for warfarin. This patient may need less than the standard dose of 5-7mg. In addition, please see package insert for further dosing guidance.

✔ **acetaminophen-oxycodone (Roxicet)** - CYP2D6 [*1/*1]
The patient is an extensive (normal) metabolizer, and changes in metabolism are not generally expected.
Analysis: Oxycodone is metabolized by CYP2D6. The patient is a extensive (normal) metabolizer, and changes in metabolism are not generally expected.

✔ **acetaminophen-oxycodone (Roxicet)** - OPRM1 [A/A]
This patient is wildtype for OPRM1. Wildtype genotypes usually require standard dosing.

warfarin (Coumadin) - CYP2C9 [*1/*1]
The patient is an extensive (normal) metabolizer and changes in metabolism are not generally expected.
Analysis: The patient is an extensive (normal) metabolizer, and changes in metabolism are not generally expected. These results should be taken into account with VKORC1 and lifestyle factors. Adjust based on patient's response and INR.

GENETIC DETAILS
The genetic makup of the patient.

GENES AFFECTING DRUG METABOLISM

ENZYME: **CYP1A2** GENOTYPE: ***1F/*1F** PHENOTYPE: **Ultra Rapid Metabolizer**
The patient is an ultra rapid metabolizer and may have decreased response to therapy due to increased metabolization of drugs.

ENZYME: **CYP2C19** GENOTYPE: ***1/*17** PHENOTYPE: **Ultra Rapid Metabolizer**
The patient is an ultra rapid metabolizer (URM). This phenotype consists of two increased activity CYP2C19 alleles. CYP2C19 URMs have markedly elevated levels of enzyme activity. For prodrugs that require activation, URMs readily convert the drug into its active metabolite. Thus, URMs may be at an increased risk of elevated exposure to the active drug metabolites and may require lower than standard dosage of prodrug. For parent (active) drugs that do not require activation, it is suggested that URMs be administered CYP2C19 metabolized drugs at an increased dosage.

ENZYME: **CYP2C9** GENOTYPE: ***1/*1** PHENOTYPE: **Extensive Metabolizer**
The patient is an extensive (normal) metabolizer and changes in metabolism are not generally expected.

ENZYME: **CYP2D6** GENOTYPE: ***1/*1** PHENOTYPE: **Extensive Metabolizer**
The patient is an extensive (normal) metabolizer, and changes in metabolism are not generally expected.

ENZYME: **CYP3A4** GENOTYPE: ***1/*3** PHENOTYPE: **Intermediate Metabolizer**
Intermediate (lower than normal) CYP3A4 metabolism is anticipated. This phenotype consists of one inactive CYP3A4 allele and one active CYP3A4 allele. It is suggested that intermediate metabolizers be administered CYP3A4 metabolized drugs at a reduced dosage. In addition, please consult drug labeling for further dosing guidelines.

ENZYME: **CYP3A5** GENOTYPE: ***3/*3** PHENOTYPE: **Poor Metabolizer**
The patient is a CYP3A5 poor metabolizer (PM). This phenotype consists of two inactive CYP3A5 alleles. CYP3A5 PMs have significantly lower levels of enzyme activity. For drugs metabolized by CYP3A5, PMs may require alternative treatments or less than standard dosage to avoid possible adverse effects. In addition, please consult drug labeling for further dosing guidance.

GENES AFFECTING RESPONSE OR FUNCTION

ENZYME: **FactorII** GENOTYPE: **G/G** PHENOTYPE: **Normal Risk**
The patient is wildtype for Factor II Prothrombin. Patients with this genotype (G/G) are associated with a normal risk of developing an abnormal blood clot.

ENZYME: **FactorV** GENOTYPE: **G/G** PHENOTYPE: **Normal Risk**
The patient is wildtype for Factor V Prothrombin. Patients with this genotype (G/G) are associated with a normal risk of developing an abnormal blood clot.

ENZYME: **MTHFR** GENOTYPE: **CC-677/AA-1298** PHENOTYPE: **Low Risk**
This genotype is associated with average (normal) enzymatic activity of MTHFR. This is associated with normal homocysteine levels, normal risk of developing abnormal blood clots, and normal risk of developing cardiovascular disease. Patient is expected to have normal folic acid metabolism. Patient is expected to have normal response to SSRI/SNRI therapy.

ENZYME: **OPRM1** GENOTYPE: **A/A** PHENOTYPE: **Normal Responder**
This patient is wildtype for OPRM1. Wildtype genotypes usually require standard dosing.

ENZYME: **SLCO1B1** GENOTYPE: ***1/*1B** PHENOTYPE: **Normal Responder**
This patient's genotype is associated with normal transporter function. No increased risk is expected.

ENZYME: **VKORC1** GENOTYPE: **G/A** PHENOTYPE: **Intermediate Sensitivity**
This patient has intermediate sensitivity for warfarin. This patient may need less than the standard dose of 5-7mg. In addition, please see package insert for further dosing guidance.

PERSONALIZED MEDICATION GUIDE
Categorized medication interactions for the patient.

ACCESSION: **PTD-00020**
PATIENT: **Doe, Jane**

Cardiovascular

Low/No Genetic Impact

azilsartan (Edarbi)	candesartan (Atacand)	carvedilol (Coreg)	flecainide (Tambocor)	fluvastatin (Lescol)
irbesartan (Avapro)	losartan (Cozaar)	metoprolol (Lopressor)	mexiletine (Mexitil)	nebivolol (Bystolic)
pindolol (Visken)	pitavastatin (Livalo)	propafenone (Rhythmol)	propranolol (Inderal)	rosuvastatin (Crestor)
timolol (Blocadren)	torsemide (Demadex)	valsartan (Diovan)		

Moderate Genetic Impact

aliskiren (Tekturna)	amiodarone (Cordarone)	amlodipine (Norvasc)	apixaban (Eliquis)	atorvastatin (Lipitor)
cilostazol (Pletal)	clopidogrel (Plavix)	diltiazem (Cardizem)	dofetilide (Tikosyn)	doxazosin (Cardura)
dronedarone (Multaq)	eplerenone (Inspra)	felodipine (Plendil)	lovastatin (Advicor,Mevacor)	nicardipine (Cardene)
nifedipine (Adalat,Procardia)	nisoldipine (Sular)	prasugrel (Effient)	quinidine (Quinidex)	ranolazine (Ranexa)
rivaroxaban (Xarelto)	simvastatin (Juvisync,Vytorin,Zocor)	ticagrelor (Brilinta)	verapamil (Calan)	warfarin (Coumadin)

High Genetic Impact

ambrisentan (Letairis)

Gastrointestinal

Low/No Genetic Impact

dronabinol (Marinol)

Moderate Genetic Impact

dexlansoprazole (Dexilant)	esomeprazole (Nexium)	lansoprazole (Prevacid)	omeprazole (Prilosec)	pantoprazole (Protonix)
rabeprazole (Aciphex)				

High Genetic Impact

Pain

Low/No Genetic Impact

celecoxib (Celebrex)	codeine	diclofenac (Voltaren)	dihydrocodeine	flurbiprofen (Ansaid)
hydrocodone (Lortab)	ibuprofen (Advil,Motrin)	indomethacin (Indocin)	meloxicam (Mobic)	morphine (Roxanol)
naloxone (Narcan)	naproxen (Aleve,Anaprox,Naprosyn)	oxycodone (Oxycontin)	piroxicam (Feldene)	tramadol (Ultram)

Moderate Genetic Impact

alfentanil (Alfenta)	bupivacaine (Sensorcaine)	buprenorphine (Buprenex,Subutex)	fentanyl	methadone
tapentadol (Nucynta)				

High Genetic Impact

carisoprodol (Soma)	cyclobenzaprine (Flexeril)	lidocaine (Lidoderm)	tizanidine (Zanaflex)	zolmitriptan (Zomig)

Psychotropic

Low/No Genetic Impact

aripiprazole (Abilify)	atomoxetine (Strattera)	chlorpromazine (Thorazine)	desipramine (Norpramin)	duloxetine (Cymbalta)
fluoxetine (Prozac)	fluphenazine (Prolixin)	fluvoxamine (Luvox)	haloperidol (Haldol)	iloperidone (Fanapt)
maprotiline (Ludiomil)	mirtazapine (Remeron)	nortriptyline (Pamelor)	paroxetine (Paxil)	perphenazine (Trilafon)
risperidone (Risperdal)	thioridazine (Mellaril)	venlafaxine (Effexor)		

Moderate Genetic Impact

alprazolam (Xanax)	buspirone (Buspar)	chlordiazepoxide (Librium)	clonazepam (Klonopin)	estazolam (Prosom)
flurazepam (Dalmane)	lurasidone (Latuda)	midazolam (Versed)	nefazodone (Serzone)	pimozide (Orap)
quetiapine (Seroquel)	sertraline (Zoloft)	trazodone (Desyrel)	triazolam (Halcion)	vortioxetine (Brintellix)
ziprasidone (Geodon)				

High Genetic Impact

amitriptyline (Elavil)	citalopram (Celexa)	clomipramine (Anafranil)	clozapine (Clozaril)	diazepam (Valium)
doxepin (Silenor)	escitalopram (Lexapro)	imipramine (Tofranil)	olanzapine (Zyprexa)	trimipramine (Surmontil)

Other				
Low/No Genetic Impact				
chlorpheniramine (Chlor-Trimeton)	chlorpropamide (Diabinese)	dextromethorphan	dimenhydrinate (Dramamine)	diphenhydramine (Benadryl)
fluorouracil (Efudex)	glimepiride (Amaryl)	glipizide (Glucotrol)	glyburide (DiaBeta)	meclizine (Antivert)
nateglinide (Starlix)	phenobarbital	phenytoin (Dilantin)	promethazine (Phenergan)	rosiglitazone (Avandia)
sulfamethoxazole	tamoxifen (Nolvadex)	tolbutamide (Orinase)	tolterodine (Detrol)	valproic acid
zafirlukast (Accolate)				
Moderate Genetic Impact				
alfuzosin (Uroxatral)	aprepitant (Emend)	boceprevir (Victrelis)	carbamazepine (Tegretol)	cinacalcet (Sensipar)
clarithromycin (Biaxin)	cyclosporine (Neoral)	delavirdine (Rescriptor)	dexamethasone (Decadron)	donepezil (Aricept)
dutasteride (Avodart)	efavirenz (Sustiva)	erythromycin	fexofenadine (Allegra)	finasteride (Proscar)
imatinib (Gleevec)	indinavir (Crixivan)	itraconazole (Sporanox)	ketoconazole (Nizoral)	linagliptin (Tradjenta)
loratadine (Claritin)	methylprednisolone (Medrol)	nevirapine (Viramune)	ondansetron (Zofran)	oxybutynin (Ditropan)
pioglitazone (Actos)	prednisone (Deltasone)	repaglinide (Prandin)	ritonavir (Norvir)	saquinavir (Invirase)
saxagliptin (Onglyza)	sildenafil (Viagra)	silodosin (Rapaflo)	sitagliptin (Januvia)	tadalafil (Cialis)
tamsulosin (Flomax)	telithromycin (Ketek)	topiramate (Topamax)	vardenafil (Levitra)	zolpidem (Ambien)
High Genetic Impact				
nelfinavir (Viracept)	voriconazole (Vfend)	zileuton (Zyflo)		

We provide our patients with a
Personalized Results Wallet Card

PHARMACOGENETIC ANALYSIS

PATIENT: **Doe, Jane**
DOB: **06/02/1973**
FACILITY: **Personal Genome**
PHYSICIAN: **System Check**

GENES AFFECTING DRUG METABOLISM		
GENE	GENOTYPE	PHENOTYPE
CYP1A2	*1F/*1F	Ultra Rapid Metabolizer
CYP2C19	*1/*17	Ultra Rapid Metabolizer
CYP2C9	*1/*1	Extensive Metabolizer
CYP2D6	*1/*1	Extensive Metabolizer
CYP3A4	*1/*3	Intermediate Metabolizer
CYP3A5	*3/*3	Poor Metabolizer
GENES AFFECTING RESPONSE OR FUNCTION		
GENE	GENOTYPE	PHENOTYPE
FactorII	G/G	Normal Risk
FactorV	G/G	Normal Risk
MTHFR	CC-677/AA-1298	Low Risk
OPRM1	A/A	Normal Responder
SLCO1B1	*1/*1B	Normal Responder
VKORC1	G/A	Intermediate Sensitivity