



Personalized Pharmacogenomic Report

ID: fJHydQz13e

Created on April 24, 2022

WHAT YOU NEED TO KNOW:

Pharmacogenomics combines pharmacology (the study of drugs) and genomics (the study of genes) and involves how a person's DNA can affect their response or risk for Adverse Drug Reactions (ADRs) to certain medications. This report provides educational information based on the medications you uploaded as well as a common set of medications, based on your RAW DNA data.

YOUR GENETIC MAKEUP

We analyzed your genetic makeup and found:

4 genetic signatures

These genetic signatures suggest you might have drug-gene interactions with certain medications.

YOUR GENETIC SIGNATURE

Specific pharmacogenomic markers, also known as star (*) alleles, define your genetic signature. The Star Allele naming system uses a combination of letters and numbers rather than genomic positions to describe certain genetic variations. The process allows professionals (like your doctor, pharmacist or genetic counselor) to quickly identify important genetic variations that may alter the functional status of genes (whether they work like normal). The ? denotes that a star allele is present, but without further DNA analysis determination of which star allele is not possible. The *1 allele typically denotes someone with "normal" function, while other star alleles carry DNA variants that may result in proteins that don't function properly.

The following non-*1/*1 star alleles were identified:

CYP4F2 *1 / *3
IFNL3 *1 / rs12979860 variant (T)
SLCO1B1 *20 / ?
UGT1A1 *1 / *80

Please consult a physician about your star alleles. I forgot what to put here. :/

YOUR GENE-DRUG ANALYSIS

1. An analysis of your DNA with a database of all FDA-approved medications identified:
4077 potential pharmacogenomic interactions

2. From the self-provided list of medications we found:

One or more DNA variants that may influence your response or risk of adverse side effects to:

LISINOPRIL

METFORMIN

SIMVASTATIN

3. From a set of 15 medications (listed below) we found:

One or more DNA variants that may influence your response or risk of adverse side effects to:

ACETAMINOPHEN

AMPHETAMINE /

ASPIRIN

DEXTROAMPHETAMINE

CODEINE

ESCITALOPRAM

FEXOFENADINE

FLUOROURACIL

IBUPROFEN

METHYLPHENIDATE

NAPROXEN

OMEPRAZOLE

PAROXETINE

PROPOFOL

SERTRALINE

SUCCINYLCHOLINE

You should discuss these findings with your healthcare provider.



PLEASE READ THE DISCLAIMERS AT THE END OF THE REPORT. IT IS IMPORTANT THAT YOU DISCUSS THE RESULTS IN THIS REPORT WITH YOUR HEALTH CARE PROVIDER BEFORE STARTING, STOPPING OR MAKING ANY OTHER CHANGES TO ANY PRESCRIPTION REGIMEN, TREATMENT, OR THERAPIES WITH WHICH YOU ARE INVOLVED.

WHAT YOUR HEALTHCARE PROVIDER NEEDS TO KNOW:

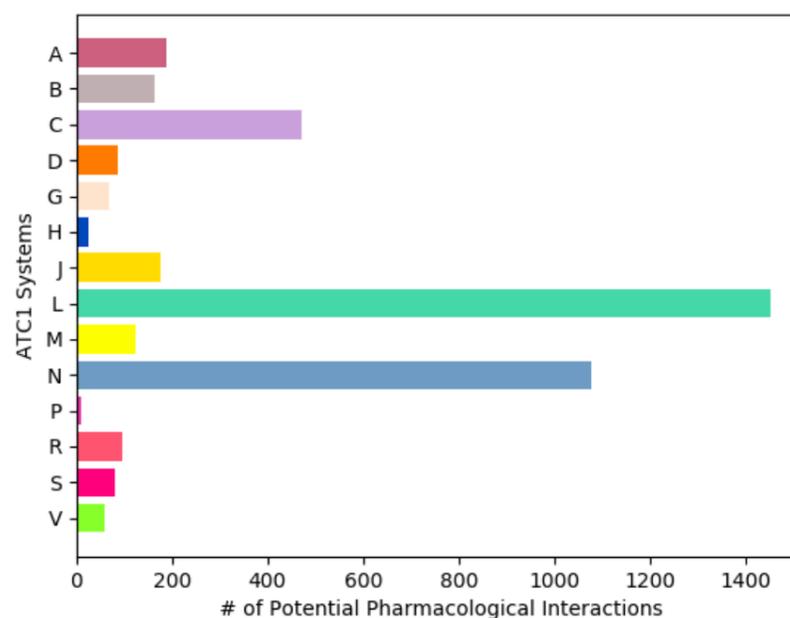
GENETIC OVERVIEW

The MyGenome_{Rx} platform analyzes DNA for PharmGKB Level 1, Level 2, and Level 3 potential drug-gene interactions using a database of all FDA-approved medications. PharmGKB Level 1 clinical Rx annotation levels have the most evidence², and in some cases medication guidelines have been established based on a persons' genetic background. MyGenome_{Rx} analysis of the raw DNA file provided identified:

4077 potential pharmacogenomics interactions

The potential pharmacogenomic interactions have been classified based on the Anatomical Therapeutic Chemical (ATC) system³ that classifies active ingredients of drugs according to the organ or system on which they act. A single drug may have more than one ATC code, and so potential drug-gene interactions may be listed in more than one ATC group. For example, aspirin is listed in categories A (for local oral treatment, B (for use as a platelet inhibitor, N (for use as analgesic and antipyretic); and C (when in combination with perindopril and amlodipine).

The graph shows the **4077** potential pharmacogenomics interactions using ATC single letters: A, GI (Alimentary) tract and metabolism; B, (Alimentary) tract and metabolism; C, Blood and blood forming organs; D, Cardiovascular system; E, Dermatologicals; F, Genito-urinary system and sex hormones; G, Systemic hormonal preparations excluding sex hormones and insulin; H, Anti-infectives; I, Oncology and immunomodulating agents; J, Musculoskeletal system; K, Nervous system; L, Antiparasitic products, insecticides, and repellents; M, Respiratory system; N, Sensory organs; O, various.



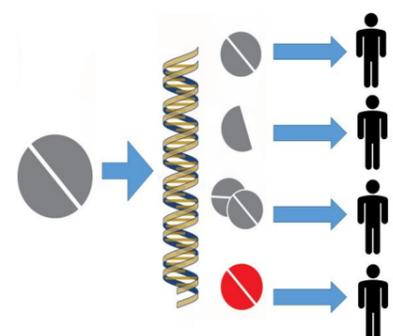
GENETIC SIGNATURE

The star (*) allele nomenclature system is used to describe important pharmacogenetic alleles. The *1 allele typically denotes the most common allele found across populations. All other star alleles carry one or more variants. For the purposes of this report, *1/*1 is assumed if no star alleles were identified. The table below indicates the star alleles identified and the medications whose side effects or response may be altered.

Gene	Star Allele/Gene Variant	Medications whose side effects/response may be altered
CYP4F2	*1 / *3	ACENOCOUMAROL, ASPIRIN, CLOPIDOGREL, PHENPROCOUMON, PHYTONADIONE, VITAMIN E, VITAMIN K, WARFARIN
IFNL3	*1 / rs12979860 variant (T)	INTERFERONS, PEGINTERFERON ALFA-2A, PEGINTERFERON ALFA-2B, RIBAVIRIN, TELAPREVIR
SLCO1B1	*20 / ?	AMPRENAVIR, ATORVASTATIN, CERIVASTATIN, CYCLOPHOSPHAMIDE, CYTARABINE, DAUNORUBICIN, DOCETAXEL, DOXORUBICIN, ENALAPRIL, EPIRUBICIN, ETOPOSIDE, FLUDARABINE, FLUOROURACIL, FLUVASTATIN, HMG COA REDUCTASE INHIBITORS, IDARUBICIN, IRINOTECAN, MERCAPTOPYRINE, METHOTREXATE, MITOXANTRONE, MYCOPHENOLATE MOFETIL, MYCOPHENOLIC ACID, PITAVASTATIN, PRAVASTATIN, REPAGLINIDE, RIFAMPIN, ROCURONIUM, ROSIGLITAZONE, ROSUVASTATIN, SIMVASTATIN, SORAFENIB
UGT1A1	*1 / *80	ATAZANAVIR, CARVEDILOL, DEFERASIROX, INDINAVIR, RISPERIDONE, WARFARIN

DETAILED DRUG-GENE REPORT

The MyGenome platform analyzes over 1 million rsIDs, from 2038 different genes to generate the information for a standard set of medications as well as any medications provided by the client. A quick summary and more detailed information on drug-gene interactions identified are provided below. Information related to the gene, reference SNP cluster ID numbers (rsID) 1, PharmGKB Clinical Evidence Level 2 and ATC organ/system classifications 3 are included. If no pharmacogenomic issues were identified, this is noted.



SUMMARY KEY

Below is a table of the symbols used in the quick summary along with classification information. The symbols in the quick summary are based on the variants identified in the RAW DNA file.

SYMBOL	CLASSIFICATION INFORMATION
	No variants detected in normal drug response expected or no increased risk for side effects.
	One or more variants were identified that are associated with an increased risk for side effects or altered drug response.
	One or more variants were identified that may substantially alter drug response or side effect profile, and a change in dosing or alternative drug may be needed.

CLIENT PROVIDED LIST OF MEDICATIONS:

Lisinopril, Metformin, Simvastatin

MEDICATION	RESULTS	
<p>LISINOPRIL</p> <p>CARDIOVASCULAR</p>		<p>You have 2 genes associated with responses for this drug. The rsIDs analyzed for the drug were rs11122576 (AGT), and rs4291 (ACE).</p>
		<p>You have 4 genes associated with side effects for this drug. The rsIDs analyzed for the drug were rs12143842, rs11122576 (AGT), rs3788853 (XPNPEP2), rs4291 (ACE), and rs1799722 (BDKRB2).</p>
<p>METFORMIN</p> <p>ALIMENTARY (GI) TRACT AND METABOLISM</p>		<p>You have 9 genes associated with responses for this drug. The rsIDs analyzed for the drug were rs628031 (SLC22A1), rs7541245 (FMO5), rs8192675 (SLC2A2), rs2076828 (SLC22A3), rs12943590 (SLC47A2), rs34834489 (SLC47A2), rs5219 (KCNJ11), rs3792269 (CAPN10), rs12208357 (SLC22A1), rs316019 (SLC22A2), rs2282143 (SLC22A1), rs622342 (SLC22A1), and rs784888 (SP1).</p>
		<p>Analysis indicates you have no DNA variants present that alter the side effect profile for this drug.</p>
<p>SIMVASTATIN</p> <p>CARDIOVASCULAR</p> <p>ALIMENTARY (GI) TRACT AND METABOLISM</p>		<p>You have 18 genes associated with responses for this drug. The rsIDs analyzed for the drug were rs2003569 (UGT1A9), rs717620 (ABCC2), rs2740574 (CYP3A4), rs4823613 (PPARA), rs4673 (CYBA), rs12487736 (SCAP), rs1137101 (LEPR), rs2306283 (SLCO1B1), rs2231142 (ABCG2), rs3917643 (F3), rs5882 (CETP), rs4253728 (PPARA), rs1800588 (LIPC), rs662799 (APOA5), rs11716445 (RHOA), rs4149081 (SLCO1B1), rs1128503 (ABCB1), rs17244841 (HMGCR), rs20455 (KIF6), rs17238540 (HMGCR), and rs662 (PON1).</p>
		<p>You have 9 genes associated with side effects for this drug. The rsIDs analyzed for the drug were rs1719247, rs4149056 (SLCO1B1), rs1128503 (ABCB1), rs17244841 (HMGCR), rs1346268, rs10455872 (LPA), rs247616, rs445925, rs1532624 (CETP), rs1008805 (CYP19A1), rs429358 (APOE), rs2230806 (ABCA1), and rs4693075 (COQ2).</p>

STANDARD SET OF MEDICATIONS

We analyze a standard set of medications for all clients. They include Analgesics: *acetaminophen, codeine*; Anesthetic agents: *propofol*; Anticancer agent: *5-fluorouracil*; Antidepressants: *escitalopram, paroxetine, sertraline*; Antihistamine: *fexofenadine*; Muscle relaxant: *succinylcholine*; Non-steroidal anti-inflammatory drugs (NSAIDs): *aspirin, ibuprofen, naproxen*; Proton Pump Inhibitor: *omeprazole*; Stimulants: *amphetamine/dextroamphetamine, methylphenidate*.

MEDICATION	RESULTS
ACETAMINOPHEN (TYLENOL) NERVOUS SYSTEM	 <p>You have 4 genes associated with responses for this drug. <i>The rsIDs analyzed for the drug were rs224534 (TRPV1), rs1799971 (OPRM1), rs1902023 (UGT2B15), and rs2070995 (KCNJ6).</i></p>
	 <p>You have 5 genes associated with side effects for this drug. <i>The rsIDs analyzed for the drug were rs1042640 (UGT1A), rs2228246 (PLCG1), rs8330 (UGT1A), rs12746200 (PLA2G4A), rs1805034 (TNFRSF11A), rs10929303 (UGT1A), and rs8330 (UGT1A;UGT1A9).</i></p>
AMPHETAMINE / DEXTROAMPHETAMINE (ADDERALL) NERVOUS SYSTEM	 <p>You have 2 genes associated with responses for this drug. <i>The rsIDs analyzed for the drug were rs12364283 (DRD2), rs510769 (OPRM1), and rs2281617 (OPRM1).</i></p>
	 <p>You have 1 gene associated with side effects for this drug. <i>One rsID was analyzed for the drug, rs4532 (DRD1).</i></p>
ASPIRIN	 <p>You have 11 genes associated with responses for this drug. <i>The rsIDs analyzed for the drug were rs10306114 (PTGS1), rs1065776 (P2RY1), rs1062535 (ITGA2), rs1126643 (ITGA2), rs2070959 (UGT1A6), rs2768759 (NTRK1), rs1613662 (GP6), rs2108622 (CYP4F2), rs1131882 (TBXA2R), rs12041331 (PEAR1), rs5985 (F13A1), rs2070995 (KCNJ6), and rs1105879 (UGT1A6).</i></p>

BLOOD AND BLOOD FORMING ORGANS
MUSCULO-SKELETAL SYSTEM
CARDIOVASCULAR
NERVOUS SYSTEM
ALIMENTARY (GI) TRACT AND METABOLISM

MEDICATION	RESULTS	
		<p>You have 31 genes associated with side effects for this drug.</p> <p>The rsIDs analyzed for the drug were rs10306114 (PTGS1), rs1042151 (HLA-DPB1), rs2071888 (TAPBP), rs1047626 (SLC30A9), rs2075797 (PTGER2), rs20417 (PTGS2), rs4523 (TBXA2R), rs1105879 (UGT1A6), rs1050891 (HNMT), rs7551789 (PTGER3), rs730012 (LTC4S), rs1059288 (TAPBP), rs1131882 (TBXA2R), rs3097671 (HLA-DPB1), rs4291 (ACE), rs16973225, rs2108622 (CYP4F2), rs2228246 (PLCG1), rs3856806 (PPARG), rs2070959 (UGT1A6), rs3818822 (CHIA), rs11819745 (THRA), rs2768759 (NTRK1), rs1074373, rs2243250 (IL4), rs12746200 (PLA2G4A), rs11587213 (FCER1G), rs1805034 (TNFRSF11A), rs1800469 (TGFB1), rs7862221 (TSC1), rs6065 (GP1BA), rs1126510 (PTGIR), rs3775291 (TLR3), rs3130100 (ZBTB22), rs10279545 (COL26A1), rs3129294 (HLA-DPB2), and rs4271002 (NAT2).</p>
<p>CODEINE (TYLENOL #3) NERVOUS SYSTEM RESPIRATORY SYSTEM</p>		<p>You have 2 genes associated with responses for this drug.</p> <p>The rsIDs analyzed for the drug were rs1799971 (OPRM1), and rs2070995 (KCNJ6).</p>
		<p>You have 12 genes associated with side effects for this drug.</p> <p>The rsIDs analyzed for the drug were rs1125394 (DRD2), rs3745274 (CYP2A7P1;CYP2B6), rs1799971 (OPRM1), rs4680 (COMT), rs2070762 (TH), rs36024412 (CRYBG2), rs6280 (DRD3), rs9282564 (ABCB1), rs2654754 (DRD3), rs6928499 (CNR1), rs9288993 (DRD3), rs4633 (COMT), rs7597593 (ZNF804A), rs324029 (DRD3), rs1051730 (CHRNA3), rs589046 (OPRM1), rs1128503 (ABCB1), rs41269255 (POM121L2), rs1076560 (DRD2), and rs510769 (OPRM1).</p>
<p>ESCITALOPRAM (LEXAPRO) NERVOUS SYSTEM</p>		<p>You have 13 genes associated with responses for this drug.</p> <p>The rsIDs analyzed for the drug were rs61888800 (BDNF), rs9380524 (FKBP5), rs2235015 (ABCB1), rs1360780 (FKBP5), rs1126757 (IL11), rs2069526 (CYP1A2), rs11580409 (ERICH3), rs4646427 (CYP1A2), rs6265 (BDNF), rs11144870 (RFK), rs4646425 (CYP1A2), rs2227631 (SERPINE1), rs41271330 (BMP5), rs10975641 (GLDC), rs915120 (GRK5), rs948854 (GAL), and rs9316233 (HTR2A).</p>
		<p>You have 5 genes associated with side effects for this drug.</p> <p>The rsIDs analyzed for the drug were rs6311 (HTR2A), rs962369 (BDNF), rs352428, rs1360780 (FKBP5), rs13306278 (COMT), rs6313 (HTR2A), rs11568817 (HTR1B), and rs10514475.</p>

MEDICATION	RESULTS	
<p>FEXOFENADINE (ALLEGRA) RESPIRATORY SYSTEM</p>		<p>You have 1 gene associated with responses for this drug. <i>One rsID was analyzed for the drug, rs2306168 (SLCO2B1).</i></p>
		<p>Analysis indicates you have no DNA variants present that alter the side effect profile for this drug.</p>
<p>FLUOROURACIL ANTINEOPLASTIC (ONCOLOGY) AND IMMUNOMODULATING AGENTS</p>		<p>You have 25 genes associated with responses for this drug. <i>The rsIDs analyzed for the drug were rs115232898 (DPYD), rs17109924 (LGR5), rs2297595 (DPYD), rs12613732 (GALNT14), rs3772809 (UMPS), rs714368 (SLC22A16), rs1801160 (DPYD), rs1056836 (CYP1B1), rs2075685 (TMEM167A;XRCC4), rs115632870 (DPYD), rs1801133 (MTHFR), rs72728438 (DPYD), rs2291078 (UMPS), rs3772810 (UMPS), rs1056515 (RGS5), rs6907567 (SLC22A16), rs2289310 (DLG5), rs1979277 (SHMT1), rs351855 (FGFR4), rs2293347 (EGFR), rs12659 (SLC19A1), rs861539 (KLC1;XRCC3), rs9380142 (HLA-G), rs13181 (ERCC2), rs17160359 (ABCB1), rs2236722 (CYP19A1), rs1801159 (DPYD), rs1801265 (DPYD), rs1047840 (EXO1), rs3218592 (REV3L), rs2854744 (IGFBP3), rs3917412 (SELE), rs9679162 (GALNT14), rs17431184 (PTEN), and rs662 (PON1).</i></p>
		<p>You have 23 genes associated with side effects for this drug. <i>The rsIDs analyzed for the drug were rs115232898 (DPYD), rs3212986 (ERCC1), rs79430272 (PIK3R2), rs4149056 (SLCO1B1), rs2960436, rs75017182 (DPYD), rs2292997, rs714368 (SLC22A16), rs20572 (CBR1), rs59086055 (DPYD), rs1801160 (DPYD), rs56022120 (PIK3R2), rs1056836 (CYP1B1), rs2273697 (ABCC2), rs4244285 (CYP2C19), rs1800566 (NQO1), rs2231142 (ABCG2), rs12248560 (CYP2C19), rs10937158 (ABCC5), rs6907567 (SLC22A16), rs1801516 (ATM), rs1801266 (DPYD), rs11479 (TYMP), rs1801268 (DPYD), rs7325568, rs11636687, rs11615 (ERCC1), rs7194667 (ABCC11), rs17626122 (PARD3B), rs1042522 (TP53), rs3918290 (DPYD), rs1695 (GSTP1), rs115457081 (IRS1), rs55886062 (DPYD), rs67376798 (DPYD), rs225440 (ABCG1), rs3740066 (ABCC2), rs9679162 (GALNT14), rs25487 (XRCC1), and rs2228100 (ALDH3A1).</i></p>
<p>IBUPROFEN (ADVIL, MOTRIN, NUPRIN) GENITO-URINARY SYSTEM CARDIOVASCULAR MUSCULO-SKELETAL SYSTEM</p>		<p>You have 1 gene associated with responses for this drug. <i>One rsID was analyzed for the drug, rs20417 (PTGS2).</i></p>

MEDICATION	RESULTS	
		<p>You have 4 genes associated with side effects for this drug.</p> <p><i>The rsIDs analyzed for the drug were rs616147 (MOBP), rs2228246 (PLCG1), rs12746200 (PLA2G4A), and rs1805034 (TNFRSF11A).</i></p>
<p>METHYLPHENIDATE (RITALIN) NERVOUS SYSTEM</p>		<p>You have 14 genes associated with responses for this drug.</p> <p><i>The rsIDs analyzed for the drug were rs11559290 (ETFDH), rs1355368 (ADGRL3), rs4805162 (ZNF565), rs3210967 (ZDHHC7), rs10420097 (ZNF211), rs757978 (FARP2), rs9901675 (FXR2), rs11552708 (SENP3), rs4680 (COMT), rs2071421 (ARSA), rs2070762 (TH), rs10413455 (ZNF134), rs3810818 (CORO7), and rs751655 (OPCML).</i></p>
		<p>You have 3 genes associated with side effects for this drug.</p> <p><i>The rsIDs analyzed for the drug were rs2283265 (DRD2), rs4532 (DRD1), and rs6280 (DRD3).</i></p>
<p>NAPROXEN (ALEVE, MENSTRIDOL) GENITO-URINARY SYSTEM MUSCULO-SKELETAL SYSTEM</p>		<p>Analysis indicates you have no DNA variants present that alter the side effect profile for this drug.</p>
		<p>You have 3 genes associated with side effects for this drug.</p> <p><i>The rsIDs analyzed for the drug were rs2228246 (PLCG1), rs12746200 (PLA2G4A), and rs1805034 (TNFRSF11A).</i></p>
<p>OMEPRAZOLE (PRILOSEC) ALIMENTARY (GI) TRACT AND METABOLISM</p>		<p>You have 1 gene associated with responses for this drug.</p> <p><i>One rsID was analyzed for the drug, rs16944 (IL1B).</i></p>
		<p>Analysis indicates you have no DNA variants present that alter the side effect profile for this drug.</p>
<p>PAROXETINE (PAXIL) NERVOUS SYSTEM</p>		<p>You have 13 genes associated with responses for this drug.</p> <p><i>The rsIDs analyzed for the drug were rs495794 (SRP19), rs6265 (BDNF), rs4680 (COMT), rs12720067 (ABCB1), rs2973049 (GDNF), rs11042725 (ADM), rs1364043 (HTR1A), rs10042486 (HTR1A), rs7787082 (ABCB1), rs153549 (REEP5), rs2235015 (ABCB1), rs948854 (GAL), rs6280 (DRD3), rs61888800 (BDNF), rs2472304 (CYP1A2), rs2235067 (ABCB1), rs1360780 (FKBP5), rs10280101 (ABCB1), rs10248420 (ABCB1), rs4646427 (CYP1A2), rs2227631 (SERPINE1), rs11983225 (ABCB1), rs153560 (REEP5), rs6295 (HTR1A), rs2470890 (CYP1A2), rs2216711 (GDNF), and rs4148740 (ABCB1).</i></p>

MEDICATION	RESULTS	
		<p>You have 5 genes associated with side effects for this drug.</p> <p>The rsIDs analyzed for the drug were rs6311 (HTR2A), rs1360780 (FKBP5), rs6313 (HTR2A), rs13306278 (COMT), rs762551 (CYP1A2), rs1160351 (MDGA2), and rs10514475.</p>
PROPOFOL (DIPRIVAN) NERVOUS SYSTEM		<p>You have 2 genes associated with responses for this drug.</p> <p>The rsIDs analyzed for the drug were rs3745274 (CYP2B6), and rs1128503 (ABCB1).</p>
		<p>You have 3 genes associated with side effects for this drug.</p> <p>The rsIDs analyzed for the drug were rs58597806 (UGT1A9), rs1801133 (MTHFR), rs1042718 (ADRB2), and rs1801131 (MTHFR).</p>
SERTRALINE (ZOLOFT) NERVOUS SYSTEM		<p>You have 7 genes associated with responses for this drug.</p> <p>The rsIDs analyzed for the drug were rs61888800 (BDNF), rs153560 (REEP5), rs495794 (SRP19), rs1360780 (FKBP5), rs2227631 (SERPINE1), rs153549 (REEP5), rs2235015 (ABCB1), rs948854 (GAL), and rs6265 (BDNF).</p>
		<p>You have 3 genes associated with side effects for this drug.</p> <p>The rsIDs analyzed for the drug were rs6311 (HTR2A), rs1360780 (FKBP5), rs6313 (HTR2A), rs13306278 (COMT), and rs10514475.</p>
SUCCINYLCHOLINE (ANECTINE, SUXAMETHONIUM) MUSCULO-SKELETAL SYSTEM		<p>Analysis indicates you have no DNA variants present that alter the side effect profile for this drug.</p>
		<p>You have 2 genes associated with side effects for this drug.</p> <p>The rsIDs analyzed for the drug were rs193922803 (RYR1), rs28933389 (BCHE), rs1803274 (BCHE), rs1799807 (BCHE), rs28933390 (BCHE), rs121918593 (RYR1), and rs63749869 (RYR1).</p>

ADDITIONAL INFORMATION

Adverse drug reactions (ADRs) are the fourth leading cause of death in the US⁴. This Report provides insights on specific variations identified in your DNA that may alter your clinical response to certain medications. Understanding what variants are present in your DNA can help guide health care providers in prescribing the best medicine for you. The educational information provided in the Report is specific to the raw DNA file that was uploaded. When used in collaboration with your healthcare providers, the Report can be used to help optimize your drug therapy choices based on your DNA. However, there are additional non-genetic factors that influence drug response such as age, weight, gender, race, diet, smoking status, comorbidities, and whether you are taking other medications.



Pharmacogenomics combines pharmacology (the study of drugs) and genomics (the study of genes and their functions) and involves how a person's DNA can affect their response to drug as well as their risk for ADRs when they take certain medications. From the moment you take a drug, your body begins to process it, in an effort to eliminate it. Most medications undergo chemical transformations in the body (a process known as metabolism) to facilitate their removal. These chemical transformations can change a drug's pharmacological activity. Modifications can also alter how long a drug stays in your body (half-life). There can be considerable variation in how different people metabolize the same drug. That is because an individual's DNA is an important factor in determining the extent to which drugs are metabolized and the speed at which metabolism occurs. By looking at what bases are present (genotype) in the DNA at certain locations (rsIDs)¹, one can gather information about the enzymes responsible for the metabolism of a drug.

The MyGenome_{RX} platform analyzes over 1 million rsIDs from 2038 different genes to determine if there are genetic variants (also known as single nucleotide polymorphisms or SNPs) present. Some of the genes screened are related to how drugs are processed by the body, or pharmacokinetics (absorption, bioavailability, distribution, metabolism, and excretion). Other genes are involved in how the drug interacts with its target, or pharmacodynamics. Variations in these genes may influence a person's drug exposure, clinical response, and/or risk for adverse effects. For most drugs, multiple genes are responsible for a person's response to a drug, the appropriate dose level, and/or the toxicity associated with taking a drug.

In the genetic overview, we have included pharmacogenomic interactions for PharmGKB Level 1, Level 2, and Level 3 gene-drug interactions. There are four levels of evidence with Level 1 being the highest level (with the most clinical evidence for drug-gene interaction) and Level 4 being the lowest level (with the least amount of evidence). If no pharmacogenomic issues were identified, this is stated.

The star (*) allele nomenclature system is used to describe important pharmacogenetic alleles. The *1 allele typically denotes the most common allele found in all populations. All other star alleles carry one or more variants. Some star alleles are defined by a single rsID, others are a combination of rsIDs. For example, CYP3A5*3 is a nonfunctional variant of CYP3A5. The CYP3A5*3 allele is defined by a single rsID, namely rs776746; the reference genotype at this position is AA. If an AG is present at this position the person would be a

carrier for one CYP3A5*3 allele, if a GG is present the person has two CYP3A5*3 alleles. If someone is AA at the rs776746 position they are considered to be CYP3A5*1/ CYP3A5*1 if no other possible variants of CYP3A5 have been interrogated, even though there may be other variants present. The positions interrogated for each gene are dependent on the platform used by the genetic testing companies. Further information can be found in the FAQ section of the MyGenome_{RX} website. For the purposes of this report, *1/*1 is assumed if no star alleles were identified. As not all genes use the Star Allele naming system this report also provides information about genetic variations using unique reference identification numbers, or rsIDs. The National Center for Biotechnology Information (NCBI) in collaboration with the National Human Genome Research Institute (NHGRI) provide a database on rsIDs (<https://www.ncbi.nlm.nih.gov/snp/>).

A quick summary and detailed information is provided on drug-gene interactions identified using the MyGenome_{RX} platform for several medications as well as any medications provided by the client. Information related to the gene, rsID¹, PharmGKB Clinical Evidence Level² and ATC organ/system classifications³ are included. More information on rsIDs¹ can be found using the NCBI dbSNP database (<https://www.ncbi.nlm.nih.gov/snp/>).

* Status of Evidence Levels

The PharmGKB Database and Evidence Levels referenced in this Report are based on information available to MyGenome_{RX} as of the date of this Report. These Evidence Levels may change over time as additional research is completed, additional links between genes and treatment outcomes are identified, studies are evaluated and confirmed by the scientific community, and additional knowledge of gene interactions with pharmaceuticals are understood.

** General Disclaimer

The Detailed Drug Gene Report is an educational tool, to be used in collaboration with your healthcare providers. MyGenome_{RX} services provide an individual the potential to optimize their drug therapy choices. This overview is not intended to be a substitute for professional medical advice, diagnosis, or treatment, and nothing in this Report or the services provided by MyGenome_{RX} should be construed as medical advice or the practice of medicine by MyGenome_{RX}. Patients should seek the advice of their physicians, pharmacists, or other qualified health care providers with any questions they may have regarding a medical condition or a medication and before starting, stopping or making other changes to your prescription regimen, your treatment or any therapies with which you are involved.

REFERENCES

- [1](#) Lazarou J, Pomernaz B, Corey P. Incidence of adverse drug reactions in hospitalized patients: a meta-analysis of prospective studies. *Surv Anesthesiol*. 1999; 43:53-4
- [2](#) Kitts, A and Sherry, S. Chapter 5. The Single Nucleotide Polymorphism Database (dbSNP) of Nucleotide Sequence Variation. *The NCBI Handbook*. McEntyre J, Ostell J, editors. Bethesda (MD): National Center for Biotechnology Information (US); 2002
- [3](#) Whirl-Carrillo M, McDonagh E M, Hebert J M, Gong L, Sangkuhl K, Thorn C F, Altman R B, Klein T E. Pharmacogenomics knowledge for personalized medicine. *Clinical pharmacology and therapeutics*. 2012. 92:414-7 PMID: 22992668
- [4](#) *The Selection and Use of Essential Medicines*. World Health Organization technical report series. 2015; (994):vii-xv, 1-54. PMID: 27183787