EXPRESS REPORT

genomind

Patient:	**Jerry Atrik**	Sample ID:	**9800902064**
Patient DOB:	**12/25/1955**	Accession ID:	**250737**
Ordering Clinician:	**Genomind Clinician**	Sample Collection Date:	**4/18/2023**
Sample Type:	**Buccal**	Sample Received Date:	**4/19/2023**
Assay Ordered:	**Genomind PGx (v3.2)**	Report Date:	**4/19/2023 1:31 PM**

Understanding this report:

1. Current medications that have a higher risk drug-drug or drug-gene interaction
2. Pharmacogenetic (PGx) risk categorization of common medications across different conditions
3. Gene result overview

Actionable interactions

Usually have specific recommendations based on PGx (dose adjustment, alternative drug considerations or increased monitoring)

- Higher Risk: large changes in drug blood levels
- Contraindication
- Responsible for major drug-drug interactions

No to moderate interactions

These drugs have lower PGx risk and are less likely to require intervention due to pharmacogenetics

- No detected interactions
- Lower Risk: small changes in drug blood levels
- Moderate Risk: moderate changes in drug blood levels

Legend:

Additional information about the nature of the gene-drug interaction

Increased Efficacy | Decreased Efficacy | Weight Gain | Actionable PGx Guidelines | Therapeutic Duplication

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Antidepressants are placed into respective categories consistent with CANMAT depression guidelines
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4994790/#!po=9.25926

Anxiety medications are placed into respective categories based on a modified AAFP GAD Treatment Algorithm
https://www.aafp.org/pubs/afp/issues/2015/0501/p617.html

Literature information reviewed by: [redacted]
Electronically signed by: [redacted]

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[redacted]

1. Current risk medications

The following medications were listed as current on the patient requisition form and have a higher risk drug-drug or drug-gene interaction. We have identified up to 5 alternative medications, ranked by their interaction risk. For additional alternative medications use our drug-gene interaction software **GenMedPro**.

RISK LEVEL	MEDICATION ASSESSMENT	POSSIBLE ALTERNATIVES (Based on USP classification)
H	**Clopidogrel** Potential increase in Clopidogrel serum levels: Decrease in active metabolites **Due to:** 2C19 Poor metabolizer, 3A4/5 Low activity	**Prasugrel** **Ticlopidine** **Ticagrelor**
H	**Ibuprofen** Potential increase in Ibuprofen serum levels: May require lower doses **Due to:** 2C9 Poor metabolizer	**Aspirin** **Diflunisal** **Etodolac** **Fenoprofen** **Ketoprofen**
H	**Rosuvastatin** Potential increase in Rosuvastatin serum levels: May require lower doses **Due to:** ABCG2 Poor function	**Pitavastatin** **Pravastatin** **Lovastatin** **Simvastatin** **Atorvastatin**

This medication list was provided on 4/18/2023.

2. PGx risk categorization

Actionable gene-drug interactions

Antidepressants (1st line)

Sertraline (Zoloft®) **Citalopram** (Celexa®)
Escitalopram (Lexapro®)

Antidepressants (2nd line or augmentation)

Amitriptyline (Elavil®) **Clomipramine** (Anafranil®)
Doxepin (Sinequan®) **Imipramine** (Tofranil®)

Anti-anxiety medications (1st line)

Sertraline (Zoloft®) **Citalopram** (Celexa®)
Escitalopram (Lexapro®)

Anti-anxiety medications (2nd line)

Diazepam (Valium®) **Amitriptyline** (Elavil®)
Clomipramine (Anafranil®) **Doxepin** (Sinequan®)

No to moderate gene-drug interactions

Antidepressants (1st line)

Fluvoxamine (Luvox®) **Paroxetine** (Paxil®)
Bupropion (Wellbutrin®) **Duloxetine** (Cymbalta®)
Mirtazapine (Remeron®) **Vortioxetine** (Trintellix®)
Fluoxetine (Prozac®) **Venlafaxine** (Effexor®)

Antidepressants (2nd line or augmentation)

L-methylfolate (Deplin®) **Desipramine** (Norpramin®)
Desvenlafaxine (Pristiq®) **Nortriptyline** (Pamelor®)
Selegeline Transdermal (Emsam®)
Dextromethorphan/Bupropion (Auvelity®)
Levomilnacipran (Fetzima®) **Aripiprazole** (Abilify®)
Brexpiprazole (Rexulti®)
Cariprazine (Vraylar®) **Trazodone** (Desyrel®)
Vilazodone (Viibryd®) **Quetiapine** (Seroquel®)

Anti-anxiety medications (1st line)

Fluvoxamine (Luvox®) **Paroxetine** (Paxil®)
Duloxetine (Cymbalta®) **Hydroxyzine** (Vistaril®)
Fluoxetine (Prozac®) **Buspirone** (Buspar®)
Venlafaxine (Effexor®)

Anti-anxiety medications (2nd line)

Lorazepam (Ativan®) **Nortriptyline** (Pamelor®)
Pregabalin (Lyrica®)
Clonazepam (Klonopin®)
Alprazolam (Xanax®) **Quetiapine** (Seroquel®)

Actionable gene-drug interactions

ADHD

No major interactions.

Statin

Atorvastatin (Lipitor®) **Fluvastatin** (Lescol®)

Rosuvastatin (Crestor®)

B-blocker

No major interactions.

Non-opioid Analgesics

Celecoxib (Celebrex®) **Flurbiprofen** (Ansaid®)

Ibuprofen (Motrin®) **Meloxicam** (Mobic®)

Piroxicam (Feldene®)

Opioids

No major interactions.

Proton Pump Inhibitors

Dexlansoprazole (Dexilant®) **Lansoprazole** (Prevacid®)

Omeprazole (Prilosec®) **Pantoprazole** (Protonix®)

No to moderate gene-drug interactions

ADHD

Amphetamine-Dextroamphetamine (Adderall®)

Atomoxetine (Strattera®) **Clonidine ER** (Kapvay®)

Dextroamphetamine (Dexedrine®)

Lisdexamfetamine (Vyvanse®) **Viloxazine** (Qelbree®)

Dexmethylphenidate (Focalin®)

Methylphenidate (Ritalin®)

Guanfacine ER (Intuniv®)

Statin

Pitavastatin (Livalo®) **Pravastatin** (Pravachol®)

Lovastatin (Mevacor®) **Simvastatin** (Zocor®)

B-blocker

Atenolol (Tenormin®) **Bisoprolol** (Ziac®)

Carvedilol (Coreg®) **Metoprolol** (Toprol®)

Nebivolol (Bystolic®)

Non-opioid Analgesics

Acetaminophen (Tylenol®) **Aspirin** (Durlaza®)

Ketorolac (Toradol®) **Nabumetone** (Relafen®)

Diclofenac (Voltaren®) **Indomethacin** (Indocin®)

Naproxen (Aleve®)

Opioids

Codeine (Unbranded) **Hydromorphone** (Dilaudid®)

Morphine (MS Contin®) **Oxymorphone** (Unbranded)

Tapentadol (Nucynta®)

Tramadol (Ultram®)

Fentanyl (Duragesic®) **Hydrocodone** (Hysingla ER®)

Oxycodone (Oxycontin®)

Proton Pump Inhibitors

Esomeprazole (Nexium®) **Rabeprazole** (Aciphex®)

Actionable gene-drug interactions

Antiplatelet

Clopidogrel (Plavix®)

Anticoagulants

Warfarin (Coumadin®)

Genitourinary

No major interactions.

Nausea / Vomiting

Dronabinol (Marinol®)

No to moderate gene-drug interactions

Antiplatelet

Prasugrel (Effient®) **Ticlopidine** (Unbranded)

Ticagrelor (Brilinta®)

Anticoagulants

Dabigatran (Pradaxa®) **Edoxaban** (Savaysa®)

Apixaban (Eliquis®) **Rivaroxaban** (Xarelto®)

Genitourinary

Flavoxate (Urispas®) **Trospium** (Sanctura®)

Mirabegron (Myrbetriq®) **Tolterodine** (Detrol®)

Darifenacin (Enablex®) **Fesoterodine** (Toviaz®)

Oxybutynin (Ditropan®) **Solifenacin** (Vesicare®)

Nausea / Vomiting

Dolasetron (Anzemet®) **Metoclopramide** (Reglan®)

Palonosetron (Aloxi®) **Prochlorperazine** (Compazine®)

Promethazine (Promethegan®)

Granisetron (Sancuso®) **Ondansetron** (Zofran®)

Rolapitant (Varubi®)

Aprepitant (Emend®)

3. Gene results overview

Pharmacokinetic Genes (Drug Metabolism / Drug Absorption)

Gene	Genotype	Phenotype	Impact
ABCB1	A/A	NF	Normal exposure is expected
ABCB1 C3435T	G/G	NF	Normal exposure is expected
ABCG2	T/T	PF	**Increased exposure to certain medications**
CYP1A2	*1B/H7	NM	Normal metabolism is expected
CYP2B6	*1/*1	NM	Normal metabolism is expected
CYP2C19	*2/*3	PM	**Risk of increased (↑) drug levels**
CYP2C9	*2/*3	PM	**Risk of increased (↑) drug levels**
CYP2D6	*1/*1	NM	Normal metabolism is expected
CYP3A4/5	*22/*22, *3/*3	LA	**Risk of increased (↑) drug levels**
SLCO1B1	*1/*1	NF	Normal exposure is expected
UGT1A4	*1a/*1a	NM	Normal metabolism is expected
UGT2B15	*1/*2	NM	Normal metabolism is expected

Pharmacodynamic Genes (Drug Targets / Mechanisms)

Antidepressant Response

Gene	Result	Impact
BDNF	Val/Val	**Moderately lower odds of response to SSRIs in East Asians**
HTR2A	G/A	No known significant clinical impact
MTHFR	C677T: T/T A1298C: A/A	**Reduced MTHFR activity and methylfolate production**
SLC6A4	L(A)/L(A)	**Higher odds of efficacy with SSRIs across most ancestry groups**

Attention-deficit/hyperactivity disorder Response

Gene	Result	Impact
ADRA2A	C/C	**Lower odds of response to methylphenidate for inattentive symptoms of ADHD**
COMT	Val/Met	No known significant clinical impact

Antipsychotic Response and Tolerability

Gene	Result	Impact
DRD2	C/DEL	**Higher risk of poor/delayed response and weight gain with certain antipsychotics in psychotic disorders**
HTR2C	T/T	**Lower risk of weight gain with 2nd generation antipsychotics**
MC4R	A/A	**Higher risk of weight gain with certain 2nd generation antipsychotics**

Other

Gene	Result	Impact
ANK3	T/T	**May prompt consideration of mood stabilizers if indicated**
CACNA1C	G/G	No known significant clinical impact
GRIK1	A/A	No known significant clinical impact
HLA-A *31:01	Negative	No known significant clinical impact
HLA-B *15:02	Negative	No known significant clinical impact
OPRM1	A/G	No known significant clinical impact

Test Methodology/Literature References

Test Methodology

This test was developed and performance characteristics were validated in the Genomind clinical laboratory. This test has not been cleared or approved by the U.S. Food and Drug Administration (FDA). This test is used for clinical purposes and should not be regarded as investigational or for research use. Genomind's laboratory is certified under the Clinical Laboratory Improvement Amendments (CLIA), as qualified to perform high complexity clinical laboratory testing. Genomind performed the testing using standard and custom TaqMan reagents for all variants. The test results are intended to be used as prognostic and not diagnostic and are not intended as the sole means for patient management decisions.

Test Methodology Limitations: Factors influencing the amount and quality of DNA extracted include but are not limited to the amount of buccal cells extracted, patient oral hygiene, collection technique, and the presence of dietary or microbial sources of nucleic acids and nucleases. DNA quality and quantity are subject to matrix dependent influences. PCR inhibitors, extraneous DNA and nucleic acid degrading enzymes are all factors which may affect the evaluation of assay results. Some single nucleotide polymorphism (SNP) assays are problematic due to multiple base repeats and other sequence aberrations, which may hinder proper amplification and analysis. DNA purity can influence the assay. SLC6A4 contains many polymorphisms, and the assay was developed and validated according to the current available scientific information. For pharmacogenetic tests like the Genomind Pharmacogenetic Report, undetected genetic and/or non-genetic factors such as drug-drug interactions may impact the phenotype. In liver transplant recipients, certain genotypes of the donor liver may not be the same as those of the recipient. In these cases, it may be necessary to account for both the donor and recipient genotypes when evaluating drug metabolism genes. However, studies to date have been inconclusive as to the relative influence of the donor and recipient genotypes. The Genomind Pharmacogenetic Report is based on a current understanding of the clinical relevance of the variant identified, penetrance, phenotype predictions, and recurrence risks.

Variants tested include ABCB1 C3435T rs1045642; ABCB1 rs2032583; ABCG2 rs2231142, ADRA2A rs1800544; ANK3 rs10994336; BDNF rs6265; CACNA1C rs1006737; COMT rs4680; CYP1A2 *1B, *1C, *1D, *1E, *1F, *1K and *11; CYP2B6 *4, *5, *6 and *9; CYP2C19 *2, *3, *4, *5, *6, *7, *8, *9, *10, *17, and *35; CYP2C9 *2, *3, *4, *5, *6, *8, *11, *13, and *27; CYP2D6 *2, *3, *4, gene deletion (*5), gene duplication, *6, *7, *8, *9, *10, *11, *12, *14, *15, *17, *29 and *41; CYP3A4 *22; CYP3A5 *3, *6, *7; DRD2 rs1799732; GRIK1 rs2832407; HLA-B*15:02 presence and HLA-A*31:01 presence detected by qPCR; HTR2A rs7997012; HTR2C rs3813929; MC4R rs489693; MTHFR rs1801131 and rs1801133; OPRM1 rs1799971; SLC6A4 rs25531 and rs63749047; SLCO1B1*5, UGT2B15 rs1902023; and UGT1A4 rs2011425. Other known variants that are not listed are not detected and will not be included in the test report.

Version 3.2 [4/24/2023]

Literature References

Summaries of references are available upon request of Genomind's comprehensive literature summary [April 2023 (V3.2)].
https://genomind.com/providers/genomind-pgx-literature-review/