GeneSight® Psychotropic
COMBINATORIAL PHARMACOGENOMIC TEST

genesight

Patient, Sample
DOB: 7/22/1984
Order Number: 9904
Report Date: 1/6/2016
Clinician: Sample Clinician
Reference: 1456CIP

Questions? Call 855.891.9415 or email medinfo@assurexhealth.com

ANTIDEPRESSANTS

USE AS DIRECTED

desvenlafaxine (Pristiq®)
levomilnacipran (Fetzima®)
vilazodone (Viibryd®)

MODERATE GENE-DRUG INTERACTION

trazodone (Desyrel®)	1
venlafaxine (Effexor®)	1
selegiline (Emsam®)	2
fluoxetine (Prozac®)	1,4
citalopram (Celexa®)	3,4
escitalopram (Lexapro®)	3,4
sertraline (Zoloft®)	3,4

SIGNIFICANT GENE-DRUG INTERACTION

bupropion (Wellbutrin®)	1,6
mirtazapine (Remeron®)	1,6
amitriptyline (Elavil®)	3,8
clomipramine (Anafranil®)	1,6,8
desipramine (Norpramin®)	1,6,8
doxepin (Sinequan®)	1,6,8
duloxetine (Cymbalta®)	1,6,8
imipramine (Tofranil®)	1,6,8
nortriptyline (Pamelor®)	1,6,8
vortioxetine (Brintellix®)	1,6,8
fluvoxamine (Luvox®)	1,4,6,8
paroxetine (Paxil®)	1,4,6,8

CLINICAL CONSIDERATIONS

1: Serum level may be too high, lower doses may be required.
2: Serum level may be too low, higher doses may be required.
3: Difficult to predict dose adjustments due to conflicting variations in metabolism.
4: Genotype may impact drug mechanism of action and result in reduced efficacy.
6: Use of this drug may increase risk of side effects.
8: FDA label identifies a potential gene-drug interaction for this medication.

All psychotropic medications require clinical monitoring.
This report is not intended to imply that the drugs listed are approved for the same indications or that they are comparable in safety or efficacy. The brand name is shown for illustrative purposes only; other brand names may be available. The prescribing physician should review the prescribing information for the drug(s) being considered and make treatment decisions based on the patient's individual needs and the characteristics of the drug prescribed.

Patient, Sample

DOB: 7/22/1984
Order Number: 9904
Report Date: 1/6/2016
Clinician: Sample Clinician
Reference: 1456CIP

Questions? Call 855.891.9415 or email medinfo@assurexhealth.com

ANXIOLYTICS AND HYPNOTICS

USE AS DIRECTED	MODERATE GENE-DRUG INTERACTION		SIGNIFICANT GENE-DRUG INTERACTION	
alprazolam (Xanax®)	**chlordiazepoxide** (Librium®)	1	**propranolol** (Inderal®)	1,6,8
buspirone (Buspar®)	**clorazepate** (Tranxene®)	1		
clonazepam (Klonopin®)	**diazepam** (Valium®)	1		
eszopiclone (Lunesta®)	**lorazepam** (Ativan®)	1		
temazepam (Restoril®)	**oxazepam** (Serax®)	1		
zolpidem (Ambien®)				

CLINICAL CONSIDERATIONS

1: Serum level may be too high, lower doses may be required.
6: Use of this drug may increase risk of side effects.
8: FDA label identifies a potential gene-drug interaction for this medication.

All psychotropic medications require clinical monitoring.
This report is not intended to imply that the drugs listed are approved for the same indications or that they are comparable in safety or efficacy. The brand name is shown for illustrative purposes only; other brand names may be available. The prescribing physician should review the prescribing information for the drug(s) being considered and make treatment decisions based on the patient's individual needs and the characteristics of the drug prescribed.

Patient, Sample

DOB: 7/22/1984
Order Number: 9904
Report Date: 1/6/2016
Clinician: Sample Clinician
Reference: 1456CIP

Questions? Call 855.891.9415 or email medinfo@assurexhealth.com

ANTIPSYCHOTICS

USE AS DIRECTED	MODERATE GENE-DRUG INTERACTION		SIGNIFICANT GENE-DRUG INTERACTION	
asenapine (Saphris®)	**fluphenazine** (Prolixin®)	1	**chlorpromazine** (Thorazine®)	1,6
lurasidone (Latuda®)	**olanzapine** (Zyprexa®)	1	**aripiprazole** (Abilify®)	1,6,8
paliperidone (Invega®)	**quetiapine** (Seroquel®)	1	**brexpiprazole** (Rexulti®)	1,6,8
thiothixene (Navane®)	**clozapine** (Clozaril®)	1,8	**iloperidone** (Fanapt®)	1,6,8
ziprasidone (Geodon®)	**haloperidol** (Haldol®)	1,8	**perphenazine** (Trilafon®)	1,6,8
			risperidone (Risperdal®)	1,6,8
			thioridazine (Mellaril®)	1,6,9

CLINICAL CONSIDERATIONS

1: Serum level may be too high, lower doses may be required.
6: Use of this drug may increase risk of side effects.
8: FDA label identifies a potential gene-drug interaction for this medication.
9: Per FDA label, this medication is contraindicated for this genotype.

All psychotropic medications require clinical monitoring.
This report is not intended to imply that the drugs listed are approved for the same indications or that they are comparable in safety or efficacy. The brand name is shown for illustrative purposes only; other brand names may be available. The prescribing physician should review the prescribing information for the drug(s) being considered and make treatment decisions based on the patient's individual needs and the characteristics of the drug prescribed.

Patient, Sample

DOB: 7/22/1984
Order Number: 9904
Report Date: 1/6/2016
Clinician: Sample Clinician
Reference: 1456CIP

Questions? Call 855.891.9415 or email medinfo@assurexhealth.com

MOOD STABILIZERS

USE AS DIRECTED	MODERATE GENE-DRUG INTERACTION		SIGNIFICANT GENE-DRUG INTERACTION	
lamotrigine (Lamictal®)	**valproic acid/divalproex** (Depakote®)	1	**oxcarbazepine** (Trileptal®)	6,8
			carbamazepine (Tegretol®)	6,8,9

NO PROVEN GENETIC MARKERS			
gabapentin (Neurontin®)	10	**topiramate** (Topamax®)	10
lithium (Eskalith®)	10		

CLINICAL CONSIDERATIONS

1: Serum level may be too high, lower doses may be required.
6: Use of this drug may increase risk of side effects.
8: FDA label identifies a potential gene-drug interaction for this medication.
9: Per FDA label, this medication is contraindicated for this genotype.
10: This medication does not have clinically proven genetic markers that allow it to be categorized.

All psychotropic medications require clinical monitoring.
This report is not intended to imply that the drugs listed are approved for the same indications or that they are comparable in safety or efficacy. The brand name is shown for illustrative purposes only; other brand names may be available. The prescribing physician should review the prescribing information for the drug(s) being considered and make treatment decisions based on the patient's individual needs and the characteristics of the drug prescribed.

Patient, Sample

DOB: 7/22/1984
Order Number: 9904
Report Date: 1/6/2016
Clinician: Sample Clinician
Reference: 1456CIP

Questions? Call 855.891.9415 or email medinfo@assurexhealth.com

PATIENT GENOTYPES AND PHENOTYPES

PHARMACODYNAMIC GENES (PD)

SLC6A4 — **Reduced Response**
S/S

This patient is homozygous for the short promoter polymorphism of the serotonin transporter gene. The short promoter allele is reported to decrease expression of the serotonin transporter compared to the homozygous long promoter allele. The patient may have a decreased likelihood of response to selective serotonin reuptake inhibitors due to the presence of the short form of the gene and may benefit from medications with an alternative mechanism of action.

HTR2A — **Increased Sensitivity**
G/G

This individual is homozygous variant for the G allele of the -1438G>A polymorphism for the Serotonin Receptor Type 2A. They carry two copies of the G allele. This genotype has been associated with an increased risk of adverse drug reactions with certain selective serotonin reuptake inhibitors.

HLA-B*1502 — **Higher Risk**
Present

This patient carries the HLA-B*1502 allele, which suggests higher risk of serious dermatologic reactions, including toxic epidermal necrolysis (TEN) and Stevens-Johnson syndrome (SJS), when taking certain mood stabilizers.

HLA-A*3101 — **Higher Risk**
A/T

This patient is heterozygous for the A allele and the T allele of the rs1061235 A>T polymorphism indicating presence of the HLA-A*3101 allele or certain HLA-A*33 alleles. This genotype suggests a higher risk of serious hypersensitivity reactions, including Stevens-Johnson syndrome (SJS), toxic epidermal necrolysis (TEN), maculopapular eruptions, and Drug Reaction with Eosinophilia and Systemic Symptoms when taking certain mood stabilizers.

Patient, Sample
DOB: 7/22/1984
Order Number: 9904
Report Date: 1/6/2016
Clinician: Sample Clinician
Reference: 1456CIP

Questions? Call 855.891.9415 or email medinfo@assurexhealth.com

PATIENT GENOTYPES AND PHENOTYPES

PHARMACOKINETIC GENES (PK)

CYP1A2 — **Extensive (Normal) Metabolizer**
*1/*1

This genotype is most consistent with the extensive (normal) metabolizer phenotype.

CYP2B6 — **Intermediate Metabolizer**
*1/*6

CYP2B6*1 allele enzyme activity: Normal
CYP2B6*6 allele enzyme activity: Reduced

This genotype is most consistent with the intermediate metabolizer phenotype. This patient may have reduced enzyme activity as compared to individuals with the normal phenotype.

CYP2C19 — **Ultrarapid Metabolizer**
*17/*17

CYP2C19*17 allele enzyme activity: Increased
CYP2C19*17 allele enzyme activity: Increased

This genotype is most consistent with the ultrarapid metabolizer phenotype. This patient may have increased enzyme activity as compared to individuals with the normal phenotype.

CYP2C9 — **Intermediate Metabolizer**
*1/*2

CYP2C9*1 allele enzyme activity: Normal
CYP2C9*2 allele enzyme activity: Reduced

This genotype is most consistent with the intermediate metabolizer phenotype. This patient may have reduced enzyme activity as compared to individuals with the normal phenotype.

CYP3A4 — **Extensive (Normal) Metabolizer**
*1/*1

CYP3A4*1 allele enzyme activity: Normal
CYP3A4*1 allele enzyme activity: Normal

This genotype is most consistent with the extensive (normal) metabolizer phenotype.

CYP2D6 — **Poor Metabolizer**
*4/*4 (Duplication)

CYP2D6*4 allele enzyme activity: None
CYP2D6*4 allele enzyme activity: None

This genotype is most consistent with the poor metabolizer phenotype. This patient may have reduced enzyme activity as compared to individuals with the normal phenotype.

A duplication of the gene CYP2D6 has been detected in this patient. While current genotyping techniques allow for the detection of this duplication, in the case of heterozygosity, such techniques do not allow for the identification of the allele that has been duplicated. This duplication, depending on the allele duplicated, can result in increased expression of CYP2D6.

UGT1A4 — **Extensive (Normal) Metabolizer**
*1/*1

UGT1A4*1 allele enzyme activity: Normal
UGT1A4*1 allele enzyme activity: Normal

This genotype is most consistent with the extensive (normal) metabolizer phenotype. The patient is expected to have normal enzyme activity.

UGT2B15 — **Intermediate Metabolizer**
*2/*2

UGT2B15*2 allele enzyme activity: Reduced
UGT2B15*2 allele enzyme activity: Reduced

This genotype is most consistent with the intermediate metabolizer phenotype. This patient may have reduced enzyme activity as compared to individuals with the normal phenotype.

Patient, Sample

DOB: 7/22/1984
Order Number: 9904
Report Date: 1/6/2016
Clinician: Sample Clinician
Reference: 1456CIP

Questions? Call 855.891.9415 or email medinfo@assurexhealth.com

GENE-DRUG INTERACTIONS

USE AS DIRECTED	CYP1A2	CYP2B6	CYP2C19	CYP2C9	CYP3A4	CYP2D6	UGT1A4	UGT2B15
ANTIDEPRESSANTS								
desvenlafaxine (Pristiq®)			●		○			
levomilnacipran (Fetzima®)			●		○	●		
vilazodone (Viibryd®)			●		○	●		
ANXIOLYTICS AND HYPNOTICS								
alprazolam (Xanax®)					○			
buspirone (Buspar®)					○	●		
clonazepam (Klonopin®)					○			
eszopiclone (Lunesta®)				●	○			
temazepam (Restoril®)		●		●	○			●
zolpidem (Ambien®)	○		●	●	○	●		
ANTIPSYCHOTICS								
asenapine (Saphris®)	○				○	●	○	
lurasidone (Latuda®)					○			
paliperidone (Invega®)					○	●		
thiothixene (Navane®)	○							
ziprasidone (Geodon®)	○				○			
MOOD STABIILIZERS								
lamotrigine (Lamictal®)							○	

MODERATE GENE-DRUG INTERACTION	CYP1A2	CYP2B6	CYP2C19	CYP2C9	CYP3A4	CYP2D6	UGT1A4	UGT2B15
ANTIDEPRESSANTS								
citalopram (Celexa®)			●		○	●		
escitalopram (Lexapro®)			●		○	●		
fluoxetine (Prozac®)			●	●	○	●		
selegiline (Emsam®)	○	●	●		○			
sertraline (Zoloft®)		●	●	●	○	●		
trazodone (Desyrel®)	○				○	●		
venlafaxine (Effexor®)			●	●	○	●		
ANXIOLYTICS AND HYPNOTICS								
chlordiazepoxide (Librium®)	○				○			●
clorazepate (Tranxene®)	○				○			●
diazepam (Valium®)	○	●	●	●	○			●
lorazepam (Ativan®)								●
oxazepam (Serax®)								●

● - Variation was found in patient genotype that may impact medication response. ○ - This gene is associated with medication response, but patient genotype is normal.

Patient, Sample

DOB: 7/22/1984
Order Number: 9904
Report Date: 1/6/2016
Clinician: Sample Clinician
Reference: 1456CIP

Questions? Call 855.891.9415 or email medinfo@assurexhealth.com

GENE-DRUG INTERACTIONS

MODERATE GENE-DRUG INTERACTION

	CYP1A2	CYP2B6	CYP2C19	CYP2C9	CYP3A4	CYP2D6	UGT1A4	UGT2B15
ANTIPSYCHOTICS								
clozapine (Clozaril®)	○				○	●	○	
fluphenazine (Prolixin®)	○		●	●	○	●		
haloperidol (Haldol®)	○				○	●	○	
olanzapine (Zyprexa®)	○				○	●	○	
quetiapine (Seroquel®)					○	●		
MOOD STABILIZERS								
valproic acid/divalproex (Depakote®)		●		●			○	

SIGNIFICANT GENE-DRUG INTERACTION

	CYP1A2	CYP2B6	CYP2C19	CYP2C9	CYP3A4	CYP2D6	UGT1A4	UGT2B15
ANTIDEPRESSANTS								
amitriptyline (Elavil®)	○		●	●	○	●	○	
bupropion (Wellbutrin®)		●			○	●		
clomipramine (Anafranil®)	○		●		○	●		
desipramine (Norpramin®)						●		
doxepin (Sinequan®)	○		●	●	○	●	○	
duloxetine (Cymbalta®)	○					●		
fluvoxamine (Luvox®)	○					●		
imipramine (Tofranil®)	○		●		○	●		
mirtazapine (Remeron®)	○			●	○	●		
nortriptyline (Pamelor®)						●		
paroxetine (Paxil®)					○	●		
vortioxetine (Brintellix®)		●	●	●	○	●		
ANXIOLYTICS AND HYPNOTICS								
propranolol (Inderal®)	○					●		
ANTIPSYCHOTICS								
aripiprazole (Abilify®)					○	●		
brexpiprazole (Rexulti®)					○	●		
chlorpromazine (Thorazine®)	○				○	●		
iloperidone (Fanapt®)					○	●		
perphenazine (Trilafon®)	○		●		○	●		
risperidone (Risperdal®)					○	●		
thioridazine (Mellaril®)	○		●		○	●		
MOOD STABILIZERS								
carbamazepine (Tegretol®)		●			○			
oxcarbazepine (Trileptal®)								

● - Variation was found in patient genotype that may impact medication response. ○ - This gene is associated with medication response, but patient genotype is normal.

Patient, Sample

DOB: 7/22/1984
Order Number: 9904
Report Date: 1/6/2016
Clinician: Sample Clinician
Reference: 1456CIP

Questions? Call 855.891.9415 or email medinfo@assurexhealth.com

TEST INFORMATION

The buccal swab sample was collected on 1/4/2016 and received in the laboratory on 1/5/2016. Genomic DNA was isolated and the relevant genomic regions were amplified by polymerase chain reaction (PCR). Analysis of SLC6A4 was completed by electrophoresis of PCR products. Analysis of CYP1A2, CYP2B6, CYP2C19, CYP2C9, CYP3A4, HLA-B*1502, HTR2A, rs1061235 (indicating presence of the HLA-A*3101 allele or certain HLA-A*33 alleles), SLC6A4, UGT1A4 and UGT2B15 was completed by using a custom xTAG® assay (Luminex Molecular Diagnostics). Analysis of CYP2D6 was completed by using xTAG® kits (Luminex Molecular Diagnostics). The following genetic variants may be detected in the assay: CYP1A2 -3860G>A, -2467T>delT, -739T>G, -729C>T, -163C>A, 2116G>A, 2499A>T, 3497G>A, 3533G>A, 5090C>T, 5347C>T; CYP2B6 *1, *4, *6, *9; CYP2C19 *1, *2, *3, *4, *5, *6, *7, *8, *17; CYP2C9 *1, *2, *3, *4, *5, *6; CYP2D6 *1, *2, *2A, *3, *4, *5, *6, *7, *8, *9, *10, *11, *12, *14, *15, *17, *41, gene duplication; CYP3A4 *1, *13, *15A, *22; HLA-B*1502 Detected, Not Detected; HTR2A -1438G>A; rs1061235 A, T; SLC6A4 L, S; UGT1A4 *1, *3; UGT2B15 *1, *2. The following rare genetic variants have not been observed by the Assurex Health, Inc. laboratory: CYP1A2 125C>G, 5166G>A, 558C>A; CYP2C19 *7.

This test was developed and its performance characteristics determined by Assurex Health. It has not been cleared or approved by the U.S. Food and Drug Administration.

These interpretations are based upon data available in scientific literature and prescribing information for the relevant drugs. Interpretations are, in some instances, based on data regarding the pharmacokinetic, pharmacodynamic and pharmacogenomics properties of a drug derived from non-clinical studies (e.g. *in vitro* studies). Findings from studies performed in a non-clinical setting or clinical studies involving healthy subjects are not necessarily indicative of clinical performance in a particular patient.

This report was reviewed and verified on 1/6/2016 by:

Nina E. King, PhD, HCLD(ABB), CC(NRCC), CQ(NYSDOH)

Disclaimer of Liability
The information contained in this report is provided as a service and does not constitute medical advice. At the time of report generation this information is believed to be current and is based upon published research; however, research data evolves and amendments to the prescribing information of the drugs listed will change over time. While this report is believed to be accurate and complete as of the date issued, THE DATA IS PROVIDED “AS IS”, WITHOUT WARRANTIES OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. As medical advice must be tailored to the specific circumstances of each case, the treating healthcare provider has ultimate responsibility for all treatment decisions made with regard to a patient including any made on the basis of a patient’s genotype.

GeneSight Psychotropic is covered by U.S Patent No. 9,111,028

Genetic testing was completed by a CLIA and CAP accredited laboratory in the United States located at:

6000 Mason-Montgomery Road
Mason, OH 45040

Customer Service
Please contact 855.891.9415 or medinfo@assurexhealth.com for assistance with report interpretation. For all other inquires please contact 866.757.9204 or support@assurexhealth.com.

GeneSight Psychotropic Version: 3.0

GeneSight® Analgesic
COMBINATORIAL PHARMACOGENOMIC TEST

genesight

Patient, Sample
DOB: 7/22/1984
Order Number: 9904
Report Date: 1/6/2016
Clinician: Sample Clinician
Reference: 1456CIP

Questions? Call 855.891.9415 or email medinfo@assurexhealth.com

OPIOIDS

USE AS DIRECTED
naltrexone (Revia®, Vivitrol®)
tapentadol (Nucynta®)

MODERATE GENE-DRUG INTERACTION

buprenorphine (Butrans®)	4
buprenorphine/naloxone (Suboxone®)	4

SIGNIFICANT GENE-DRUG INTERACTION

fentanyl (Duragesic®)	4
hydromorphone (Dilaudid®)	4
meperidine (Demerol®)	4
methadone (Dolophine®)	4
morphine (Avinza®)	4
oxymorphone (Opana®)	4
tramadol (Ultram®)	3,4
hydrocodone (Vicodin®)	1,4,6
oxycodone (Oxycontin®)	1,4,6
codeine (Codeine Contin®)	1,4,6,8

NON-OPIOIDS

USE AS DIRECTED
ketorolac (Toradol®)

MODERATE GENE-DRUG INTERACTION

carisoprodol (Soma®)	1
cyclobenzaprine (Flexeril®)	2,7
naproxen (Aleve®, Naprosyn®)	3,7

SIGNIFICANT GENE-DRUG INTERACTION

ibuprofen (Advil®, Motrin®)	1,6
meloxicam (Mobic®)	1,6
celecoxib (Celebrex®)	1,6,8
diclofenac (Voltaren®)	1,6,8

CLINICAL CONSIDERATIONS

1: Serum level of the active compound may be too high, lower doses may be required.
2: Serum level of the active compound may be too low, higher doses may be required.
3: Difficult to predict dose adjustments due to conflicting variations in metabolism.
4: Genotype may impact drug mechanism of action and result in reduced efficacy.
6: Use of this drug may increase risk of side effects.
7: Serum level may be too low in smokers.
8: FDA label identifies a potential gene-drug interaction for this medication.

All analgesic medications require clinical monitoring.
This report is not intended to imply that the drugs listed are approved for the same indications or that they are comparable in safety or efficacy. The brand name is shown for illustrative purposes only; other brand names may be available. The prescribing physician should review the prescribing information for the drug(s) being considered and make treatment decisions based on the patient's individual needs and the characteristics of the drug prescribed.

Patient, Sample
DOB: 7/22/1984
Order Number: 9904
Report Date: 1/6/2016
Clinician: Sample Clinician
Reference: 1456CIP

Questions? Call 855.891.9415 or
email medinfo@assurexhealth.com

PATIENT GENOTYPES AND PHENOTYPES

PHARMACODYNAMIC GENES (PD)

OPRM1 — **Reduced Response**
G/G

This patient is homozygous for the 118A>G mutation and may experience reduced response to opioid agonists.

PHARMACOKINETIC GENES (PK)

CYP1A2 — **Ultrarapid Metabolizer**
-163C>A - A/A

This genotype is most consistent with the ultrarapid metabolizer phenotype. This patient may have increased enzyme activity as compared to individuals with the normal phenotype.

CYP2B6 — **Extensive (Normal) Metabolizer**
*1/*1

CYP2B6*1 allele enzyme activity: Normal
CYP2B6*1 allele enzyme activity: Normal

This genotype is most consistent with the extensive (normal) metabolizer phenotype.

CYP2C19 — **Intermediate Metabolizer**
*1/*2

CYP2C19*1 allele enzyme activity: Normal
CYP2C19*2 allele enzyme activity: None

This genotype is most consistent with the intermediate metabolizer phenotype. This patient may have reduced enzyme activity as compared to individuals with the normal phenotype.

CYP2C9 — **Poor Metabolizer**
*2/*2

CYP2C9*2 allele enzyme activity: Reduced
CYP2C9*2 allele enzyme activity: Reduced

This genotype is most consistent with the poor metabolizer phenotype. This patient may have reduced enzyme activity as compared to individuals with the normal phenotype.

CYP3A4 — **Extensive (Normal) Metabolizer**
*1/*1

CYP3A4*1 allele enzyme activity: Normal
CYP3A4*1 allele enzyme activity: Normal

This genotype is most consistent with the extensive (normal) metabolizer phenotype.

CYP2D6 — **Ultrarapid Metabolizer**
*2A/*2A

CYP2D6*2A allele enzyme activity: Increased
CYP2D6*2A allele enzyme activity: Increased

This genotype is most consistent with the ultrarapid metabolizer phenotype. This patient may have increased enzyme activity as compared to individuals with the normal phenotype.

Patient, Sample

DOB: 7/22/1984
Order Number: 9904
Report Date: 1/6/2016
Clinician: Sample Clinician
Reference: 1456CIP

Questions? Call 855.891.9415 or email medinfo@assurexhealth.com

GENE-DRUG INTERACTIONS

USE AS DIRECTED	CYP1A2	CYP2B6	CYP2C19	CYP2C9	CYP3A4	CYP2D6
OPIOIDS						
naltrexone (Revia®, Vivitrol®)						
tapentadol (Nucynta®)			●	●		●
NON-OPIOIDS						
ketorolac (Toradol®)						

MODERATE GENE-DRUG INTERACTION	CYP1A2	CYP2B6	CYP2C19	CYP2C9	CYP3A4	CYP2D6
OPIOIDS						
buprenorphine (Butrans®)					○	
buprenorphine/naloxone (Suboxone®)			●		○	●
NON-OPIOIDS						
carisoprodol (Soma®)			●			
cyclobenzaprine (Flexeril®)	●				○	●
naproxen (Aleve®, Naprosyn®)	●			●		

SIGNIFICANT GENE-DRUG INTERACTION	CYP1A2	CYP2B6	CYP2C19	CYP2C9	CYP3A4	CYP2D6
OPIOIDS						
codeine (Codeine Contin®)					○	●
fentanyl (Duragesic®)					○	
hydrocodone (Vicodin®)				●	○	●
hydromorphone (Dilaudid®)				●	○	●
meperidine (Demerol®)		○	●		○	
methadone (Dolophine®)		○	●	●	○	●
morphine (Avinza®)					○	
oxycodone (Oxycontin®)					○	●
oxymorphone (Opana®)					○	
tramadol (Ultram®)		○			○	●
NON-OPIOIDS						
celecoxib (Celebrex®)				●	○	
diclofenac (Voltaren®)			●	●	○	
ibuprofen (Advil®, Motrin®)			●	●	○	
meloxicam (Mobic®)				●	○	

● - Variation was found in patient genotype that may impact medication response.
○ - This gene is associated with medication response, but patient genotype is normal.

Patient, Sample

DOB: 7/22/1984
Order Number: 9904
Report Date: 1/6/2016
Clinician: Sample Clinician
Reference: 1456CIP

Questions? Call 855.891.9415 or email medinfo@assurexhealth.com

TEST INFORMATION

The buccal swab sample was collected on 1/4/2016 and received in the laboratory on 1/5/2016. Genomic DNA was isolated and the relevant genomic regions were amplified by polymerase chain reaction (PCR). Analysis of CYP1A2, CYP2B6, CYP2C19, CYP2C9, CYP3A4 and OPRM1 was completed by using a custom xTAG® assay (Luminex Molecular Diagnostics). Analysis of CYP2D6 was completed by using xTAG® kits (Luminex Molecular Diagnostics). The following genetic variants may be detected in the assay: CYP1A2 -3860G>A, -2467T>delT, -739T>G, -729C>T, -163C>A, 2116G>A, 2499A>T, 3497G>A, 3533G>A, 5090C>T, 5347C>T; CYP2B6 *1, *4, *6, *9; CYP2C19 *1, *2, *3, *4, *5, *6, *7, *8, *17; CYP2C9 *1, *2, *3, *4, *5, *6; CYP2D6 *1, *2, *2A, *3, *4, *5, *6, *7, *8, *9, *10, *11, *12, *14, *15, *17, *41, gene duplication; CYP3A4 *1, *13, *15A, *22; OPRM1 118A>G. The following rare genetic variants have not been observed by the Assurex Health, Inc. laboratory: CYP1A2 125C>G, 5166G>A, 558C>A; CYP2C19 *7.

This test was developed and its performance characteristics determined by Assurex Health. It has not been cleared or approved by the U.S. Food and Drug Administration.

These interpretations are based upon data available in scientific literature and prescribing information for the relevant drugs. Interpretations are, in some instances, based on data regarding the pharmacokinetic, pharmacodynamic and pharmacogenomics properties of a drug derived from non-clinical studies (e.g. *in vitro* studies). Findings from studies performed in a non-clinical setting or clinical studies involving healthy subjects are not necessarily indicative of clinical performance in a particular patient.

This report was reviewed and verified on 1/6/2016 by:

Nina E. King, PhD, HCLD(ABB), CC(NRCC), CQ(NYSDOH)

Disclaimer of Liability
The information contained in this report is provided as a service and does not constitute medical advice. At the time of report generation this information is believed to be current and is based upon published research; however, research data evolves and amendments to the prescribing information of the drugs listed will change over time. While this report is believed to be accurate and complete as of the date issued, THE DATA IS PROVIDED “AS IS”, WITHOUT WARRANTIES OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. As medical advice must be tailored to the specific circumstances of each case, the treating healthcare provider has ultimate responsibility for all treatment decisions made with regard to a patient including any made on the basis of a patient’s genotype.

Genetic testing was completed by a CLIA and CAP accredited laboratory in the United States located at:

6000 Mason-Montgomery Road
Mason, OH 45040

Customer Service
Please contact 855.891.9415 or medinfo@assurexhealth.com for assistance with report interpretation. For all other inquires please contact 866.757.9204 or support@assurexhealth.com.

GeneSight Analgesic Test Version: 2.0

GeneSight® ADHD
COMBINATORIAL PHARMACOGENOMIC TEST

genesight

Patient, Sample
DOB: 7/22/1984
Order Number: 9904
Report Date: 1/6/2016
Clinician: Sample Clinician
Reference: 1456CIP

Questions? Call 855.891.9415 or email medinfo@assurexhealth.com

USE AS DIRECTED		MODERATE GENE-DRUG INTERACTION		SIGNIFICANT GENE-DRUG INTERACTION	
		amphetamine salts (Adderall®)	1	**clonidine** (Kapvay®)	1,4
		dextroamphetamine (Dexedrine®)	1	**atomoxetine** (Strattera®)	1,5
		lisdexamfetamine (Vyvanse®)	1		
		dexmethylphenidate (Focalin®)	4		
		guanfacine (Intuniv®)	4		
		methylphenidate (Ritalin®, Concerta®, Metedate®, Daytrana®)	4		

CLINICAL CONSIDERATIONS

1: Serum level may be too high, lower doses may be required
4: ADRA2A genotype suggests a reduced response to this medication
5: CYP2D6 genotype indicates that this patient may experience increased side-effects, but also increased efficacy

All ADHD medications require clinical monitoring.
This report is not intended to imply that the drugs listed are approved for the same indications or that they are comparable in safety or efficacy. The brand name is shown for illustrative purposes only; other brand names may be available. The prescribing physician should review the prescribing information for the drug(s) being considered and make treatment decisions based on the patient's individual needs and the characteristics of the drug prescribed.

Patient, Sample
DOB: 7/22/1984
Order Number: 9904
Report Date: 1/6/2016
Clinician: Sample Clinician
Reference: 1456CIP

Questions? Call 855.891.9415 or email medinfo@assurexhealth.com

PATIENT GENOTYPES AND PHENOTYPES

PHARMACODYNAMIC GENES (PD)

COMT — **Intermediate Activity**
VAL/MET

This patient is heterozygous for the Val158Met polymorphism in the catechol-o-methlytransferase gene. They have one copy of the Met allele and one copy of the Val allele. Carriers of this genotype are more likely to have a typical response to stimulant medications.

ADRA2A — **Reduced Response**
C/C

This patient is homozygous for the C allele of the -1291G>C polymorphism in the adrenergic alpha-2A receptor gene, which has been shown to reduce binding affinity. This genotype suggests a reduced response to certain ADHD medications.

PHARMACOKINETIC GENES (PK)

CYP2D6 — **Poor Metabolizer**
*4/*4

CYP2D6*4 allele enzyme activity: None
CYP2D6*4 allele enzyme activity: None

This genotype is most consistent with the poor metabolizer phenotype. This patient may have reduced enzyme activity as compared to individuals with the normal phenotype.

CYP2D6 Pharmacokinetic Drug Interactions

Some ADHD medications are metabolized by the CYP2D6 enzyme. Concomitant use of these medications with substances known to inhibit CYP2D6 enzyme activity may result in increased levels of the ADHD medication.

ADHD Medications Metabolized by the CYP2D6 Enzyme

amphetamine salts (Adderall®)
dextroamphetamine (Dexedrine®)
lisdexamfetamine (Vyvanse®)
atomoxetine (Strattera®)
clonidine (Kapvay®)

Known Inhibitors of CPY2D6 Enzyme Activity

Concomitant use may increase the level of ADHD medications metabolized by the CYP2D6 enzyme

Antianginal
nicardipine
ranolazine
Antiarrhythmic
amiodarone
quinidine
Antibacterial
isoniazid
Anticholinergic
darifenacin
Antidepressant
bupropion
clomipramine
desipramine
duloxetine
fluoxetine
imipramine
paroxetine
sertraline
Antifungal
ketoconazole
miconazole
terbinafine
Antihistamine
diphenhydramine
Antimalarial
pyrimethamine
quinine
Antineoplastic
imatinib
Antiplatelet
ticlopidine
Antipsychotic
chlorpromazine
clozapine
haloperidol
thioridazine
Antiretroviral
delavirdine
ritonavir
Antithyroid
methimazole
Antiulcer
cimetidine
Hyperparathyroid
cinacalcet
Local Anesthetic
lidocaine
Psychostimulant
cocaine
Sedative
dexmedetomidine

This drug interaction information is based upon data available in scientific literature and prescribing information for the most commonly prescribed drugs. Only CYP2D6 interactions based on published data from in vivo studies showing moderate to significant induction/inhibition, as defined by the FDA, are listed. The degree of inhibition may vary. Additional interactions may exist. Please reference FDA approved drug information for additional drug interaction data.

Patient, Sample

DOB: 7/22/1984
Order Number: 9904
Report Date: 1/6/2016
Clinician: Sample Clinician
Reference: 1456CIP

Questions? Call 855.891.9415 or
email medinfo@assurexhealth.com

TEST INFORMATION

The buccal swab sample was collected on 1/4/2016 and received in the laboratory on 1/5/2016. Genomic DNA was isolated and the relevant genomic regions were amplified by polymerase chain reaction (PCR). Analysis of COMT and ADRA2A was completed by using a custom xTAG® assay (Luminex Molecular Diagnostics). Analysis of CYP2D6 was completed using xTAG® kits (Luminex Molecular Diagnostics). The following genetic variants may be detected in the assay: ADRA2A -1291C>G; COMT Val158Met; CYP2D6 *1, *2, *2A, *3, *4, *5, *6, *7, *8, *9, *10, *11, *12, *14, *15, *17, *41, gene duplication.

This test was developed and its performance characteristics determined by Assurex Health. It has not been cleared or approved by the U.S. Food and Drug Administration.

These interpretations are based upon data available in scientific literature and prescribing information for the relevant drugs. Interpretations are, in some instances, based on data regarding the pharmacokinetic, pharmacodynamic and pharmacogenomics properties of a drug derived from non-clinical studies (e.g. *in vitro* studies). Findings from studies performed in a non-clinical setting or clinical studies involving healthy subjects are not necessarily indicative of clinical performance in a particular patient.

This report was reviewed and verified on 1/6/2016 by:

Nina E. King, PhD, HCLD(ABB), CC(NRCC), CQ(NYSDOH)

Disclaimer of Liability
The information contained in this report is provided as a service and does not constitute medical advice. At the time of report generation this information is believed to be current and is based upon published research; however, research data evolves and amendments to the prescribing information of the drugs listed will change over time. While this report is believed to be accurate and complete as of the date issued, THE DATA IS PROVIDED “AS IS”, WITHOUT WARRANTIES OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. As medical advice must be tailored to the specific circumstances of each case, the treating healthcare provider has ultimate responsibility for all treatment decisions made with regard to a patient including any made on the basis of a patient’s genotype.

Genetic testing was completed by a CLIA and CAP accredited laboratory in the United States located at:

6000 Mason-Montgomery Road
Mason, OH 45040

Customer Service
Please contact 855.891.9415 or medinfo@assurexhealth.com for assistance with report interpretation. For all other inquires please contact 866.757.9204 or support@assurexhealth.com.

GeneSight ADHD Version: 1.2.1

GeneSight® MTHFR
COMBINATORIAL PHARMACOGENOMIC TEST

genesight

Patient, Sample
DOB: 7/22/1984
Order Number: 9904
Report Date: 1/6/2016
Clinician: Sample Clinician
Reference: 1456CIP

Questions? Call 855.891.9415 or email medinfo@assurexhealth.com

NORMAL FOLIC ACID CONVERSION	REDUCED FOLIC ACID CONVERSION	SIGNIFICANTLY REDUCED FOLIC ACID CONVERSION
		✓

Note: Serum levels of folate may be too low. Folate supplementation or higher daily intake of folic acid may be required.

PATIENT GENOTYPE AND PHENOTYPE

MTHFR	Reduced Activity	T/T

This individual is homozygous for the T allele of the C677T polymorphism in the MTHFR gene. This genotype is associated with significantly reduced folic acid metabolism, significantly decreased serum folate levels, and significantly increased homocysteine levels.

TEST INFORMATION

The buccal swab sample was collected on 1/4/2016 and received in the laboratory on 1/5/2016. Genomic DNA was isolated and the relevant genomic regions were amplified by polymerase chain reaction (PCR). Analysis of MTHFR was completed by using a custom xTAG® assay (Luminex Molecular Diagnostics). The following genetic variant may be detected in the assay: MTHFR 677C>T.

This test was developed and its performance characteristics determined by Assurex Health. It has not been cleared or approved by the U.S. Food and Drug Administration.

These interpretations are based upon data available in scientific literature and prescribing information for the relevant drugs. Interpretations are, in some instances, based on data regarding the pharmacokinetic, pharmacodynamic and pharmacogenomics properties of a drug derived from non-clinical studies (e.g. *in vitro* studies). Findings from studies performed in a non-clinical setting or clinical studies involving healthy subjects are not necessarily indicative of clinical performance in a particular patient.

This report was reviewed and verified on 1/6/2016 by:

Nina King

Nina E. King, PhD, HCLD(ABB), CC(NRCC), CQ(NYSDOH)

Disclaimer of Liability
The information contained in this report is provided as a service and does not constitute medical advice. At the time of report generation this information is believed to be current and is based upon published research; however, research data evolves and amendments to the prescribing information of the drugs listed will change over time. While this report is believed to be accurate and complete as of the date issued, THE DATA IS PROVIDED "AS IS", WITHOUT WARRANTIES OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. As medical advice must be tailored to the specific circumstances of each case, the treating healthcare provider has ultimate responsibility for all treatment decisions made with regard to a patient including any made on the basis of a patient's genotype.

Genetic testing was completed by a CLIA and CAP accredited laboratory in the United States located at:

6000 Mason-Montgomery Road
Mason, OH 45040

Customer Service
Please contact 855.891.9415 or medinfo@assurexhealth.com for assistance with report interpretation. For all other inquires please contact 866.757.9204 or support@assurexhealth.com.

GeneSight MTHFR Version: 1.0