CARDIAC DNA INSIGHT®

Protected Health Information

PERSONAL DETAILS

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GENDER	F
ETHNICITY	Caucasian

ORDERING HEALTHCARE PROFESSIONAL

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TEST METHODOLOGY

Genotyping by array-based evaluation of multiple molecular probes

LABORATORY INFO

ACCESSION NUMBER	G3515323
ACTIVATION CODE	PGLQL-LMDWP
SPECIMEN TYPE	SALIVA
COLLECTED DATE	Apr 27, 2016
RECEIVED DATE	May 5, 2016
REPORT DATE	May 26, 2016

Test Results Reviewed & Approved by:
Laboratory Director,
Nilesh Dharajiya, M.D.

Pharmacogenetics ✓

BETA-BLOCKERS

REDUCED THERAPEUTIC BENEFIT
TYPICAL THERAPEUTIC BENEFIT

Gene Tested - GRK5

Description

This patient has a GRK5 genotype that is associated with a typical survival benefit on beta-blockers and, therefore, may have a typical response to beta-blocker therapy. This result is based on a single study of heart failure patients and may not apply to patients being treated for other conditions. Additionally, this genetic effect was found in African-American patients, and it is not known if patients of non-African ancestry are similarly affected. Response to beta-blockers also varies with age, gender, medical history and coprescribed medication.

Pharmacogenetics ✓

BETA-BLOCKERS, LVEF RESPONSE

ENHANCED BENEFIT
BENEFICIAL

Gene Tested - ADRB1

Description

This patient's genotype is associated with enhanced benefit in left ventricular ejection fraction (LVEF) following beta-blocker therapy. This result is based on studies of heart failure patients and may not apply to patients being treated for other conditions. This genetic effect is not consistent in all studies and influence of this variant on beta-blocker response in other indications, such as atrial fibrillation or hypertension, is uncertain. See "Condition-Specific Limitations" in the "Risks and Limitations" section of this report for more information.

Pharmacogenetics ✓

CAFFEINE METABOLISM

FAST METABOLIZER
SLOW METABOLIZER

Gene Tested - CYP1A2

Description

This patient's genotype is associated with a rapid rate of caffeine metabolism. The patient does not have the CYP1A2 allele (C allele at rs762551) that is associated with increased risk of myocardial infarction when consuming high amounts of caffeine (four or more cups of coffee daily). In addition to genetics, caffeine metabolism depends on lifestyle factors, such as amount of coffee consumed, smoking and hormonal birth control. This result may not apply to Asians, as the rs762551 marker has not been observed to be associated with caffeine metabolism in Asians.

See Disclaimer(s) on page 12 of this Report

Pharmacogenetics

CLOPIDOGREL METABOLISM

ULTRARAPID METABOLIZER
EXTENSIVE METABOLIZER
INTERMEDIATE METABOLIZER
POOR METABOLIZER

Gene Tested - CYP2C19

Description

This patient has increased risk of stent thrombosis following percutaneous coronary intervention compared to most patients treated with the same dose of clopidogrel. Alternative therapies, such as prasugrel, should be considered. This patient's genotype is associated with decreased CYP2C19 enzyme activity, and, thus, the patient may have lower plasma concentrations of the active metabolite of clopidogrel. CYP2C19 genotype and metabolizer status may also affect responses to other drugs.

Pharmacogenetics

ESTROGEN SUPPLEMENTATION

INCREASED RISK OF VENOUS THROMBOSIS
TYPICAL RISK OF VENOUS THROMBOSIS

Genes Tested - F2, F5

Description

This patient does not have either the Factor V Leiden mutation or the prothrombin G20210A variant; therefore, the patient does not have increased risk of developing venous thrombosis when taking combined hormonal contraceptives or estrogen for hormone replacement therapy.

Pharmacogenetics

METOPROLOL METABOLISM

EXTENSIVE METABOLIZER
INTERMEDIATE METABOLIZER
POOR METABOLIZER

Gene Tested - CYP2D6

Description

This patient's genotype is associated with typical blood pressure and heart rate responses to metoprolol. This patient's genotype is also associated with normal CYP2D6 enzyme activity and typical plasma concentrations of metoprolol. A small percentage of patients with this genotype may metabolize metoprolol at higher than normal rates and, thus, may not achieve optimal plasma concentrations at standard doses. The drug label warns that CYP2D6 inhibitors are likely to increase metoprolol plasma concentrations and decrease cardioselectivity of metoprolol. CYP2D6 genotype and metabolizer status may also affect responses to other drugs.

Pharmacogenetics

PERINDOPRIL

LIKELY NON-RESPONDER
LIKELY RESPONDER

Genes Tested - AGTR1, BDKRB1

Description

This patient is unlikely to benefit from standard doses of ACE inhibitors, such as perindopril, and alternative treatments could be considered. This result is based on a study of patients with stable coronary artery disease (CAD) and may not apply to patients who do not have stable CAD. In one study, there was no reduction in risk of cardiovascular death, non-fatal myocardial infarction or resuscitated cardiac arrest for patients with stable CAD who have this genotype and were treated with an ACE inhibitor. Perindopril was used to generate the observed effect but other ACE inhibitors might also result in a similar effect.

Pharmacogenetics

SIMVASTATIN-INDUCED MYOPATHY

INCREASED RISK

TYPICAL RISK

Gene Tested - SLCO1B1

Description

This patient does not have increased risk of developing myopathy if treated with simvastatin. While this patient's genetic likelihood of developing simvastatin-induced myopathy is significantly lower than those who have the risk variant, many other factors involved in simvastatin-induced myopathy are still unknown. Therefore, individuals with this genotype still have typical risk of myopathy when treated with simvastatin. The most recent simvastatin label should be consulted for updated prescribing information regarding simvastatin dosing limitations and drug-drug interactions.

Pharmacogenetics

VERAPAMIL AND QTC INTERVAL

INCREASED RISK OF PROLONGATION

TYPICAL RISK OF PROLONGATION

Gene Tested - NOS1AP

Description

This patient does not have a NOS1AP genotype that is associated with increased risk of verapamil-induced QTc interval prolongation; therefore, the patient has no known genetic risk for QTc prolongation if treated with verapamil. QTc interval length depends on many factors, including age, gender, other genes, other medications and specific disease pathologies. See "Condition-Specific Limitations" in the "Risks and Limitations" section of this report for more information.

Pharmacogenetics

VERAPAMIL VS. ATENOLOL

INCREASED BENEFIT ON ATENOLOL

INCREASED BENEFIT ON VERAPAMIL

SIMILAR BENEFIT ON VERAPAMIL OR ATENOLOL

Gene Tested - CACNA1C

Description

This patient may have increased benefit when treated with verapamil instead of atenolol to control blood pressure. This result is based on a study of patients with hypertension and stable coronary artery disease and may not apply to patients being treated for other conditions. Benefits included decreased incidence of death, myocardial infarction or stroke. See "Condition-Specific Limitations" in the "Risks and Limitations" section of this report for more information.

Pharmacogenetics

WARFARIN

SUBSTANTIALLY INCREASED SENSITIVITY

INCREASED SENSITIVITY

TYPICAL SENSITIVITY

Genes Tested - CYP2C9, VKORC1

Description

This patient's genotype is not associated with increased sensitivity to warfarin. Appropriate warfarin dose varies greatly between patients; in addition to genetic factors, clinical factors, such as age, sex, body weight, race, comorbidities and interacting medications, also contribute to dose variability. Consideration of VKORC1 and CYP2C9 genotypes, in addition to clinical factors, is recommended for selection of initial dose. The most recent warfarin label should be consulted for up-to-date warfarin-dosing guidelines and limitations.

► **NOT A CARRIER**:

This patient does not carry the HbS mutation responsible for sickle cell anemia.

Carrier Status ✓ **NOT A CARRIER OF THE FOLLOWING**

HOMOZYGOTE
CARRIER
NOT A CARRIER

NOT A CARRIER

Sickle Cell Anemia

Health Conditions ✓ **CORONARY ARTERY DISEASE**

INCREASED RISK
ABOVE AVERAGE RISK
AVERAGE RISK

Genes Tested - CDH13, HNF1A, Intergenic_10q11, Intergenic_1q41, Intergenic_2q36, Intergenic_5q21, Intergenic_8p22, Intergenic_9p21, MRAS, MTHFD1L, SEZ6L, SMAD3

Description

This patient has above average genetic risk for coronary artery disease. This does not mean the patient will develop the disease. This test outcome was determined using genetic laboratory results in conjunction with the patient's self-reported ethnicity. Depending on personal and family health history, a screening or prevention program, as well as patient education regarding the importance of regular exercise and maintenance of a healthy lifestyle may be appropriate.

Health Conditions ✓ **HYPERTENSION**

INCREASED RISK
ABOVE AVERAGE RISK
AVERAGE RISK

Genes Tested - BCAT1, PPARGC1A

Description

This patient has above average genetic risk for hypertension. This does not mean the patient will develop the disease. This test outcome was determined using genetic laboratory results in conjunction with the patient's self-reported ethnicity. A low-fat, low-salt diet high in fruits and vegetables could be advised to reduce disease risk.

Health Conditions ✓ **MYOCARDIAL INFARCTION**

INCREASED RISK
ABOVE AVERAGE RISK
AVERAGE RISK

Genes Tested - CXCL12, Intergenic_1p13, Intergenic_21q22, Intergenic_9p21, MIA3, OR13G1, PCSK9, PHACTR1, PRR4, SH2B3, WDR12

Description

This patient has above average genetic risk for myocardial infarction. This does not mean the patient will develop the disease. This test outcome was determined using genetic laboratory results in conjunction with the patient's self-reported ethnicity. Patient education regarding the importance of maintaining a healthy weight, regular exercise, and selecting a low-sodium diet with lots of fruits and vegetables to reduce disease risk may be appropriate.

Health Conditions

PERIPHERAL ARTERIAL DISEASE

INCREASED RISK
ABOVE AVERAGE RISK
AVERAGE RISK

Gene Tested - CHRNA3

Description

This patient has above average genetic risk for peripheral arterial disease. This does not mean the patient will develop the disease. This test outcome was determined using genetic laboratory results in conjunction with the patient's self-reported ethnicity. Patient education regarding the importance of avoiding exposure to tobacco smoke, maintenance of a healthy weight and diet, and regular exercise may be appropriate to reduce disease risk.

Health Conditions

ATRIAL FIBRILLATION

INCREASED RISK
ABOVE AVERAGE RISK
AVERAGE RISK

Gene Tested - PITX2

Description

This patient has typical genetic risk for atrial fibrillation. This does not mean the patient will or will not develop the disease. This test outcome was determined using genetic laboratory results in conjunction with the patient's self-reported ethnicity. General preventive measures, such as exercise, smoking cessation and limiting alcohol consumption, could be encouraged.

Health Conditions

DIABETES, TYPE 1

INCREASED RISK
ABOVE AVERAGE RISK
AVERAGE RISK

Genes Tested - CLEC16A, CTLA4, ERBB3, HLA, IFIH1, IL2RA, INS, Intergenic_4q27, PTPN2, PTPN22, SH2B3

Description

This patient has typical genetic risk for type 1 diabetes. This does not mean the patient will or will not develop the disease. This test outcome was determined using genetic laboratory results in conjunction with the patient's self-reported ethnicity.

Health Conditions

DIABETES, TYPE 2

INCREASED RISK
ABOVE AVERAGE RISK
AVERAGE RISK

Genes Tested - CDKAL1, CDKN2B, ESR1, FTO, HHEX, HNF1B, IGF2BP2, JAZF1, KCNJ11, KCNQ1, MTNR1B, NOTCH2, PPARG, SLC30A8, TCF7L2, WFS1

Description

This patient has typical genetic risk for type 2 diabetes. This does not mean the patient will or will not develop the disease. This test outcome was determined using genetic laboratory results in conjunction with the patient's self-reported ethnicity. General preventive measures and patient education regarding the importance of regular physical activity and maintaining a healthy weight could be considered.

Nutrition

GENETIC RISK FOR DECREASED FOLATE

OPTIMIZE INTAKE
STAY BALANCED

Gene Tested - MTHFR

Description

This patient's genotype is not associated with lower plasma levels of folate. Folate can lower the plasma level of homocysteine, and diets rich in folate are associated with reduced risk of cardiovascular disease. Folate is particularly important early in pregnancy for preventing some birth defects.

Metabolic Health Factors

GENETIC RISK FOR ELEVATED LDL CHOLESTEROL

HIGH RISK
ABOVE AVERAGE RISK
AVERAGE RISK
BELOW AVERAGE RISK
LOW RISK

Genes Tested - ABCG8, APOB, CELSR2, HMGCR, HNF1A, intergenic, LDLR, MAFB, NCAN, PCSK9

Description

This patient has above average genetic risk for borderline-high LDL cholesterol levels (above 130 mg/dl). However, this result does not mean that the patient has borderline-high LDL cholesterol levels. Monitoring the patient's blood levels of LDL cholesterol could be considered.

Metabolic Health Factors

GENETIC RISK FOR DECREASED HDL CHOLESTEROL

HIGH RISK
ABOVE AVERAGE RISK
AVERAGE RISK
BELOW AVERAGE RISK
LOW RISK

Genes Tested - ABCA1, ANGPTL4, CETP, FADS1, GALNT2, HNF4A, KCTD10, LCAT, LIPC, LIPG, LPL, PLTP, TTC39B, ZNF259

Description

This patient has average genetic risk for decreased HDL cholesterol levels. However, this result does not mean that the patient has optimal HDL cholesterol levels. Routine screening for blood cholesterol levels should be performed at appropriate ages as recommended by the U.S. Preventive Services Task Force and other groups.

Metabolic Health Factors

GENETIC RISK FOR ELEVATED TRIGLYCERIDES

HIGH RISK
ABOVE AVERAGE RISK
AVERAGE RISK
BELOW AVERAGE RISK
LOW RISK

Genes Tested - ANGPTL3, APOB, FADS1, GCKR, LPL, MLXIPL, NCAN, PLTP, TRIB1, XKR6, ZNF259

Description

This patient has average genetic risk for elevated triglyceride levels. However, this result does not mean that the patient has optimal triglyceride levels.

GENOTYPE/HAPLOTYPE DETAIL

PHARMACOGENETICS

This section lists the genetic markers that were tested for Pharmacogenetics. Results are organized by drug response. Each drug response may have two sections, which includes a "Genetic Result" section and an associated table with three columns. "Genetic Result" indicates the haplotype, genotype or presence of a mutation. A genetic result that contains “ND” indicates that a haplotype could not be determined. “Unable To Report” indicates that no result can be provided.

In the tables, results are organized by drug response into three columns:

1. “Gene/Locus” refers to the gene or intergenic region where the marker is located.
2. “Marker” refers to the unique identifier of the tested marker.
3. “Genotype” refers to the combination of nucleotides at a particular marker. The letter(s) on each side of the slash refer(s) to the two copies of the patient’s DNA. "Del" indicates a deletion of the nucleotide(s) in the patient's DNA. A genotype of “- -“ indicates that a result could not be obtained.

BETA-BLOCKERS

GENE/LOCUS	MARKER	GENOTYPE
GRK5	rs17098707	A/A

BETA-BLOCKERS, LVEF RESPONSE

GENE/LOCUS	MARKER	GENOTYPE
ADRB1	rs1801253	C/C

CAFFEINE METABOLISM

Genetic Result: CYP1A2 *1/*1

GENE/LOCUS	MARKER	GENOTYPE
CYP1A2	rs762551	A/A

CLOPIDOGREL METABOLISM

Genetic Result: CYP2C19 *2/*17

GENE/LOCUS	MARKER	GENOTYPE
CYP2C19	rs4244285	G/A
CYP2C19	rs4986893	G/G
CYP2C19	rs12248560	C/T
CYP2C19	rs28399504	A/A
CYP2C19	rs41291556	T/T
CYP2C19	rs56337013	C/C
CYP2C19	rs72552267	G/G

ESTROGEN SUPPLEMENTATION

Genetic Result: Factor V Leiden mutation (0 copies); Prothrombin G20210A mutation (0 copies)

GENE/LOCUS	MARKER	GENOTYPE
F2	Prothrombin G20210A	G/G

ESTROGEN SUPPLEMENTATION

Genetic Result: Factor V Leiden mutation (0 copies); Prothrombin G20210A mutation (0 copies)

GENE/LOCUS	MARKER	GENOTYPE
F5	Factor V Leiden	G/G

METOPROLOL METABOLISM

Genetic Result: CYP2D6 *1/*1

GENE/LOCUS	MARKER	GENOTYPE
CYP2D6	rs16947	C/C
CYP2D6	rs769258	G/G
CYP2D6	rs1065852	C/C
CYP2D6	rs1080985	C/C
CYP2D6	rs3892097	G/G
CYP2D6	rs5030655	T/T
CYP2D6	rs5030656	AAG/AAG
CYP2D6	rs5030865	G/G
CYP2D6	rs28371706	C/C
CYP2D6	rs28371725	G/G
CYP2D6	rs35742686	A/A
CYP2D6	rs59421388	G/G

PERINDOPRIL

GENE/LOCUS	MARKER	GENOTYPE
AGTR1	rs5182	C/C
AGTR1	rs275651	A/A
BDKRB1	rs12050217	A/G

SIMVASTATIN-INDUCED MYOPATHY

GENE/LOCUS	MARKER	GENOTYPE
SLCO1B1	rs4149056	T/T

VERAPAMIL AND QTC INTERVAL

GENE/LOCUS	MARKER	GENOTYPE
NOS1AP	rs10494366	T/G

VERAPAMIL VS. ATENOLOL

GENE/LOCUS	MARKER	GENOTYPE
CACNA1C	rs1051375	A/A

WARFARIN

Genetic Result: CYP2C9 *1/*1; VKORC1 G/A

GENE/LOCUS	MARKER	GENOTYPE
CYP2C9	rs1057910	A/A
CYP2C9	rs1799853	C/C
CYP2C9	rs9332131	A/A
VKORC1	rs9923231	G/A

CARRIER STATUS

This section lists the individual mutations that were tested for Carrier Status. Tested mutations are organized by disease and contained in brackets next to their respective genes.

- If the patient carries a tested mutation, it will be highlighted in red in the “Carrier of” section.
- If the patient does not carry a tested mutation, it will be listed in black in the “Not a Carrier of” section.
- If a result could not be obtained for a mutation, it is listed in the “No Data for” section.
- “Pending” indicates that the patient’s test for this disease is still in progress.
- “Unable To Report” indicates that no result can be provided.

Residual risk: since there are many rare mutations, it is possible to carry a mutation that is not included in our test.

SICKLE CELL ANEMIA

Not a Carrier of: HBB [Hemoglobin S]

HEALTH CONDITIONS

This section lists the genetic markers that were tested for Health Conditions. Results are organized by condition into three columns.

1. “Gene/Locus” refers to the gene or intergenic region where the marker is located.
2. “Marker” refers to the unique identifier of the tested marker.
3. “Genotype” refers to the combination of nucleotides at a particular marker. The letter(s) on each side of the slash refer(s) to the two copies of the patient’s DNA. "Del" indicates a deletion of the nucleotide(s) in the patient's DNA. A genotype of “- -“ indicates that a result could not be obtained.

“Unable To Report” indicates that no result can be provided. The strength of scientific evidence for each marker is available in the technical bulletin of the corresponding condition.

CORONARY ARTERY DISEASE

GENE/LOCUS	MARKER	GENOTYPE
CDH13	rs8055236	T/G
HNF1A	rs2259816	C/C
Intergenic_10q11	rs501120	A/A
Intergenic_1q41	rs3008621	A/G
Intergenic_2q36	rs2943634	A/C
Intergenic_5q21	rs383830	A/A
Intergenic_8p22	rs17411031	C/C
Intergenic_9p21	rs1333049	C/C
MRAS	rs9818870	C/C
MTHFD1L	rs6922269	A/G
SEZ6L	rs688034	C/C
SMAD3	rs17228212	T/C

HYPERTENSION

GENE/LOCUS	MARKER	GENOTYPE
BCAT1	rs7961152	A/A
PPARGC1A	rs8192678	A/G

MYOCARDIAL INFARCTION

GENE/LOCUS	MARKER	GENOTYPE
CXCL12	rs1746048	C/C
Intergenic_1p13	rs646776	A/A
Intergenic_21q22	rs9982601	C/C
Intergenic_9p21	rs10757278	G/G
MIA3	rs17465637	A/C
OR13G1	rs1151640	G/G
PCSK9	rs11206510	T/C

MYOCARDIAL INFARCTION

GENE/LOCUS	MARKER	GENOTYPE
PHACTR1	rs12526453	G/C
PRR4	rs1376251	C/C
SH2B3	rs3184504	C/C
WDR12	rs6725887	T/T

PERIPHERAL ARTERIAL DISEASE

GENE/LOCUS	MARKER	GENOTYPE
CHRNA3	rs1051730	T/C

ATRIAL FIBRILLATION

GENE/LOCUS	MARKER	GENOTYPE
PITX2	rs2200733	C/C

DIABETES, TYPE 1

GENE/LOCUS	MARKER	GENOTYPE
CLEC16A	rs12708716	A/A
CTLA4	rs3087243	G/G
ERBB3	rs11171739	C/C
HLA	rs2187668	G/G
HLA	rs7454108	T/T
IFIH1	rs1990760	T/T
IL2RA	rs12251307	C/C
INS	rs3741208	C/C
Intergenic_4q27	rs2069763	T/G
PTPN2	rs1893217	T/T
PTPN22	rs2476601	G/G
SH2B3	rs3184504	C/C

DIABETES, TYPE 2

GENE/LOCUS	MARKER	GENOTYPE
CDKAL1	rs10946398	A/A
CDKN2B	rs10811661	T/T

DIABETES, TYPE 2

GENE/LOCUS	MARKER	GENOTYPE
ESR1	rs3020314	T/C
FTO	rs8050136	A/C
HHEX	rs1111875	A/A
HNF1B	rs7501939	C/C
IGF2BP2	rs1470579	A/A
JAZF1	rs864745	A/G
KCNJ11	rs5219	C/C
KCNQ1	rs2237892	C/C
MTNR1B	rs10830963	C/C
NOTCH2	rs10923931	G/G
PPARG	rs1801282	C/C
SLC30A8	rs13266634	T/C
TCF7L2	rs7903146	T/C
WFS1	rs10010131	G/G

DIET, NUTRITION AND EXERCISE RESPONSES

This section lists the genetic markers that were tested for Diet, Nutrition and Exercise Responses. Results are organized by condition into four columns:

1. "Gene/Locus" refers to the gene or intergenic region where the marker is located.
2. "Marker" refers to the unique identifier of the tested marker.
3. "Genotype" refers to the combination of nucleotides at a particular marker. The letter(s) on each side of the slash refer(s) to the two copies of the patient's DNA. A genotype of "- -" indicates that a result could not be obtained.
4. "Strength" refers to strength of research evidence for the genetic marker and the associated result. Four filled boxes indicate a study of over 2,000 people and at least one study that replicated the results. Three filled boxes indicate a study of over 400 people. Two filled boxes indicate a study of less than 400 people; studies in this category are preliminary but pass Pathway's criteria for statistical significance. One filled box indicates that results are extremely preliminary.

"Unable To Report" indicates that no result can be provided.

GENETIC RISK FOR DECREASED FOLATE

GENE/LOCUS	MARKER	GENOTYPE	STRENGTH
MTHFR	rs1801133	C/C	■■■

GENETIC RISK FOR ELEVATED LDL CHOLESTEROL

GENE/LOCUS	MARKER	GENOTYPE	STRENGTH
ABCG8	rs6544713	T/C	■■■■
APOB	rs515135	G/G	■■■■
CELSR2	rs12740374	G/G	■■■■
HMGCR	rs3846663	T/C	■■■■
HNF1A	rs2650000	C/C	■■■■
intergenic	rs1501908	G/G	■■■■
LDLR	rs6511720	G/G	■■■■
MAFB	rs6102059	T/T	■■■■
NCAN	rs10401969	T/T	■■■■
PCSK9	rs11206510	T/C	■■■■

GENETIC RISK FOR DECREASED HDL CHOLESTEROL

GENE/LOCUS	MARKER	GENOTYPE	STRENGTH
ABCA1	rs1883025	A/G	■■■■
ANGPTL4	rs2967605	G/G	■■■■
CETP	rs247616	A/G	■■■■
FADS1	rs174547	T/C	■■■■
GALNT2	rs4846914	A/A	■■■■
HNF4A	rs1800961	C/C	■■■■
KCTD10	rs2338104	C/G	■■■■
LCAT	rs2271293	A/G	■■■■
LIPC	rs10468017	C/C	■■■■

GENETIC RISK FOR DECREASED HDL CHOLESTEROL

GENE/LOCUS	MARKER	GENOTYPE	STRENGTH
LIPG	rs4939883	C/C	■■■■
LPL	rs12678919	A/A	■■■■
PLTP	rs7679	T/C	■■■■
TTC39B	rs471364	A/A	■■■■
ZNF259	rs964184	C/C	■■■■

GENETIC RISK FOR ELEVATED TRIGLYCERIDES

GENE/LOCUS	MARKER	GENOTYPE	STRENGTH
ANGPTL3	rs10889353	A/A	■■■■
APOB	rs7557067	A/G	■■■■
FADS1	rs174547	T/C	■■■■
GCKR	rs1260326	T/C	■■■■
LPL	rs12678919	A/A	■■■■
MLXIPL	rs714052	T/T	■■■■
NCAN	rs17216525	C/C	■■■■
PLTP	rs7679	T/C	■■■■
TRIB1	rs2954029	A/T	■■■■
XKR6	rs7819412	A/G	■■■■
ZNF259	rs964184	C/C	■■■■

See Disclaimer(s) on page 12 of this Report

RESIDUAL RISK AFTER NEGATIVE TEST RESULTS

In the case of a negative test result (not a carrier), there is a residual risk that the patient may have a mutation that is not part of the test panel. Included in the table below are the residual risk estimates for the carrier conditions in the Pathway Genomics carrier status test. Population carrier rate, carrier detection rate and residual risk are shown for conditions and specific populations for which the data is known. For other conditions listed below and populations that are not shown, the prevalence is rare, the mutation detection rate is unknown and residual risk is not calculable.

For individuals with a “NOT A CARRIER” result for a condition for which there is suggestive personal and/or family history, additional genetic testing may be indicated.

For questions regarding the interpretation of residual risk information, please contact Pathway Genomics' genetic counseling department at (877) 505-7374 or counselors@pathway.com.

SICKLE CELL ANEMIA

POPULATION	CARRIER RATE	DETECTION RATE	RESIDUAL RISK
African American	1:15	100.0%	0
Native American	1:150	100.0%	0
Hispanic	1:203	100.0%	0
Arab	1:478	100.0%	0
Caucasian	1:642	100.0%	0
Asian Indian	1:652	100.0%	0
Filipino	1:879	100.0%	0
Asian	1:1315	100.0%	0
Southeast Asian	1:2365	100.0%	0

See Disclaimer(s) on page 12 of this Report

DISCLAIMER

This test was developed and its performance characteristics determined by Pathway Genomics Corporation. It has not been cleared or approved by the FDA. The laboratory is regulated under CLIA as qualified to perform high-complexity testing. This test is used for clinical purposes. It should not be regarded as investigational or for research.

If you have any questions about this report or wish to speak with one of Pathway Genomics' genetic counselors, please call (877) 505.7374.

RISKS AND LIMITATIONS

Risk of Laboratory Technical Problems or Laboratory Error

The certified testing laboratory has standard and effective procedures in place to protect against technical and operational problems. However, such problems may still occur. The testing laboratory receives samples collected by patients and physicians. Problems in shipping to the laboratory or sample handling can occur, including but not limited to damage to the specimen or related paperwork, mislabeling, and loss or delay of receipt of the specimen. Laboratory problems can occur that might lead to inability to obtain results. Examples include, but are not limited to, sample mislabeling, DNA contamination, un-interpretable results, and human and/or testing system errors. In such cases, the testing laboratory may need to request a new sample. However, upon re-testing, results may still not be obtainable.

As with all medical laboratory testing, there is a small chance that the laboratory could report inaccurate information. For example, the laboratory could report that a given genotype is present when in fact it is not. Any kind of laboratory error may lead to incorrect decisions regarding medical treatment and/or diet and fitness recommendations. If a laboratory error has occurred or is suspected, a health care professional may wish to pursue further evaluation and/or other testing. Further testing may be pursued to verify any results for any reason.

General Limitations

The purpose of this test is to provide information about how a tested individual's genes may affect carrier status for some inherited diseases, responses to some drugs, risk for specific common health conditions, and/or selected diet, nutrition and/or exercise responses, as well as to learn more about the tested individual's ancient ancestry, depending upon the specific genetic testing that is ordered by the health care professional. Tested individuals should not make any changes to any medical care (including but not limited to changes to dosage or frequency of medications, diet and exercise regimens, or pregnancy planning) based on genetic testing results without consulting a health care professional.

The science behind the significance or interpretation of certain testing results continues to evolve. Although great strides have been made to advance the potential usefulness of genetic testing, there is still much to be discovered. Genetic testing is based upon information, developments and testing techniques that are known today. Future research may reveal changes in the interpretation of previously obtained genetic testing results. For example, any genetic test is limited by the variants being tested. The interpretation of the significance of some variants may change as more research is done about them. Some variants that are associated with disease, drug response, or diet, nutrition and exercise response may not be tested; possibly these variants have not yet been identified in genetic studies.

Many of the conditions and drug responses that are tested are dependent on genetic factors as well as nongenetic factors such as age, personal health and family health history, diet, and ethnicity. As such, an individual may not exhibit the specific drug response, disease, or diet, nutrition and exercise response consistent with the genetic test results.

Another limitation for some conditions, particularly in the areas of diet and exercise, is that genetic associations have been studied and observed in Caucasian populations only. In this case, the interpretations and recommendations are made in the context of Caucasian studies, but the results may or may not be relevant to tested individuals who are of non-Caucasian or mixed ethnicities.

Based on test results and other medical knowledge of the tested individual, health care professionals might consider additional independent testing, or consult another health care professional or genetic counselor.

Condition-Specific Limitations

The conditions below may not apply to all report types.

- Beta-blockers, LVEF response: whether or not the tested variant modifies the outcomes of beta-blocker therapy is still controversial.
- Verapamil and QTc interval: the association of the tested marker with verapamil-induced QTc interval prolongation has not yet been independently replicated.
- Verapamil vs. atenolol: the association of the tested marker with benefits of verapamil versus atenolol has not been independently replicated.

See Disclaimer(s) on page 12 of this Report

RESULT STATUS DEFINITIONS

Amended 	Test results and/or patient information that have been revised in a way that does not impact the clinical significance of the result(s) and/or patient diagnosis, treatment or management.
Corrected 	Test results and/or patient information that have been revised in a way that may impact the clinical significance of the result(s) and/or patient diagnosis, treatment or management.
Final 	Test results that are available at the time of report issue or have been revised from pending status to final status.
Pending 	Test results that are not available at the time of report issue. All pending results will be specified in the report.

