Final Report Date:	09-25-2018 15:10	**Specimen Collected:**	09-24-2018 15:10
Accession ID:	1809250267	**Specimen Received:**	09-25-2018 09:10

LAST NAME	FIRST NAME	MIDDLE NAME	GENDER	DATE OF BIRTH	ACCESSION ID
CARDIAX	DEMO		MALE	1996-04-13	1809250267

PATIENT

Name: DEMO CARDIAX
Date of Birth: 1996-04-13
Gender: Male
Age: 22
Height: 6'1" Weight: 169.0 lbs

Telephone #: 666-666-8888
Street Address: 1021 HOWARD AVENUE SUITE B
City: SAN CARLOS
State: CA Zip #: 94070
Email: demo@demo.com

Fasting: FASTING

PROVIDER

Practice Name: Demo Client, MD
Provider Name: Demo Client, MD (999994)
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City: SAN CARLOS
State: CA
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Vibrant Wellness is pleased to present to you, **CardiaX** testing, to help you make healthy lifestyle choices in consultation with your physicians and dietitians. It is intended to be used as a tool to encourage a general state of health and well-being.

CardiaX is a genetic microarray test which detects and interprets variants known to be associated with increased predispositions to various heart conditions and metabolic responses to certain associated pharmacological agents. Its intended use is to help reduce the risk of certain heart conditions by making healthy lifestyle choices.

Interpretation of Report: The test results of individual cardiovascular genes are represented by the alleles (Homozygous Wild, Heterozygous or Homozygous Mutant). SNP genotyping is the measurement of genetic variations of single nucleotide polymorphisms (SNPs) between members of a species. It is a form of genotyping, which is the measurement of more general genetic variation. SNPs are one of the most common types of genetic variation. A SNP is a single base pair mutation at a specific locus, usually consisting of two alleles (where the rare allele frequency is > 1%). An **allele** is the variant form of a given gene. **Wild type (WT)** refers to the phenotype of the typical form of a species as it occurs in nature. **Mutant type (MT)** refers to the rare phenotype (mutation) of the species.

The results are displayed surrounded by GREEN (Low Risk Genes), YELLOW (Moderate Risk Genes) or RED (Increased Risk Genes) box. Potential risk, related information and potential risk mitigation choices are presented and will populate for individual genes if you have a YELLOW or RED result.

Ratings for the references are calculated based on the Impact Factor, Citations, and Study Population of the references which correlate the gene with the associated conditions. It is indicated based on a star based system (1 star – 5 stars) with 5 stars indicating the best correlation of the gene with the potential associated risk. The Impact Factor of the journal in which the reference is published is the number of citations received by articles published in that journal during the two preceding years, divided by the total number of articles published in that journal during the two preceding years. Study population includes the number of samples tested along with gender, age and ethnicity of the population.

Vibrant Wellness is a personalized health analytics company founded out of our passion to serve patients and providers. The Vibrant Wellness platform provides tools for you to track and analyze your general wellness profile. All testing offered by Vibrant Wellness is performed at a CLIA approved lab testing facility and licensed by California Department of Public Health.

Please Note - It is important that you discuss any modifications to your diet, exercise and nutritional supplementation with your physician before making any changes.

To schedule an appointment with Vibrant Clinical Dietitians please call: Toll-Free 866-364-0963.

LAST NAME	FIRST NAME	MIDDLE NAME	GENDER	DATE OF BIRTH	ACCESSION ID
CARDIAX	DEMO		MALE	1996-04-13	1809250267

MUTANT (Homozygote): Most Abnormal

Gene	Summary Risk
9p21	Coronary Heart Disease,Inflammation,Plaque rupture,Abdominal Aortic Aneurysm,Atherosclerosis,Myocardial Infarction
4q25	Atrial Fibrillation,Ischemic Stroke
1q25	Coronary Heart Disease
MTHFR	Hypertension,Myocardial Infarction,Endothelial Dysfunction,Hyperhomocysteinemia
Corin	Hypertension,Congestive heart failure,Cardiovascular disease,Pre-Eclampsia(pregnant women)
NOS3	Hypertension,Coronary Heart Disease,Myocardial Infarction
ADR-B2	Venous Thrombosis,Hypertension,Ischemic Stroke
AGTR1	Hypertension

Heterozygote: Abnormal

Gene	Summary Risk
6p24.1	Venous Thrombosis,Coronary Heart Disease
COMT	Coronary Heart Disease,Hypertension,Myocarial Infarction
CYP11B2	Hypertension,Aldosterone Enzyme Disorder
GSHPx	Hypertension,Coronary Heart Disease,Myocardial Infarction,Left Ventricular Hypertrophy,Congestive heart failure
Apo A2	Dyslipidemia,Obesity
CYP4A11	Hypertension
ApoC3	Dyslipidemia,Coronary Heart Disease

Wild (Normal)

Gene	Summary Risk
ACE I/D	
CYP1A2	
SCARB1	
Apo A1	
CYP4F2	

LAST NAME	FIRST NAME	MIDDLE NAME	GENDER	DATE OF BIRTH	ACCESSION ID
CARDIAX	DEMO		MALE	1996-04-13	1809250267

Increased Risk:

Gene	Analyte	Potential Risk
AGTR1	R186D C/C Homozygous Mutant	**Increased risk of** Hypertension
ADR-B2	R714D G/G Homozygous Mutant	**Increased risk for** Idiopathic venous thromboembolism Ischemic Stroke High Blood Pressure.
NOS3	R226D T/T Homozygous Mutant R983D T/T Homozygous Mutant	**Increased risk for** CHD MI Hypertension

Potential Risk Mitigation Choices

AGTR1 polymorphisms directly affect the RAAS system which controls blood pressure, depending on dietary potassium intake.

ACE inhibitors and angiotensin receptor inhibitors can be used to reduce high blood pressure and risk for heart failure.

Lowering sodium and increasing potassium intake has been shown to help reduce blood pressure.

Please refer to the supplementary table for specific food and nutrient recommendations.

Potential Risk Mitigation Choices

Dietary interventions such as DASH diet or Mediterranean diet are recommended for reducing blood pressure.

A whole foods plant based diet is high in dietary fiber which can help reduce blood pressure.

High fiber, low-fat diets, combined with exercise, reduce the risk of Venous Thrombosis.

Please refer to the supplementary table for specific food and nutrient recommendations.

Potential Risk Mitigation Choices

The 3 mutations in NOS3 gene lead to decreased production of Nitrous oxide or impede its travel to the cell membrane. Nitric oxide precursors can be used as supplements to compensate for these mutations.

Alternatively, exercise helps vascular endothelium release nitrous oxide, which relaxes arteries and increases blood flow.

Plant foods, particularly beets and leafy greens like kale, Swiss chard, arugula, and spinach, are rich in dietary nitrates and nitrites—compounds that stimulate the production of Nitrous oxide in the body.

Please refer to the supplementary table for specific food and nutrient recommendations.

LAST NAME	FIRST NAME	MIDDLE NAME	GENDER	DATE OF BIRTH	ACCESSION ID
CARDIAX	DEMO		MALE	1996-04-13	1809250267

Corin

R55ID T/T Homozygous Mutant R68PD C/C Homozygous Mutant	**Increased Risk of** Hypertension Congestive heart failure CVD Pre-Eclampsia(pregnant women)

Potential Risk Mitigation Choices

Corin is a serine protease which is a key enzyme in the bio-synthesis of atrial natriuretic peptide (ANP) and brain natriuretic peptide (BNP) which regulate sodium and fluid balance, intravascular volume and blood pressure.

Mutations in corin genes lead to increased risk for sodium-sensitive hypertension.

Maintaining a healthy weight is important to avoid hypertension and other heart conditions.

Regular exercise, combined with a heart healthy diet rich in fiber, can help control blood pressure.

Reducing sodium intake and increasing potassium intake from vegetables has been shown to reduce blood pressure.

Pregnant women with risk for pre-eclampsia should consult with their physician and dietitian

Please refer to the supplementary table for specific food and nutrient recommendations.

MTHFR

1298A>C C/C Homozygous Mutant	The polymorphism affects the conversion of MTHF to BH4 (tetrahydrobiopterin), an important cofactor in the production of neurotransmitters, synthesis of nitric oxide, and detoxification of ammonia leading to **Increased risk for** Endothelial dysfunction Hypertension Thrombosis Cardiovascular Disease Coronary Heart Disease Myocardial Infarction Hyperhomocysteinemia Other neurological diseases

Potential Risk Mitigation Choices

Methylation supplementation is recommended for individuals who carry the mutations of the MTHFR genes.

Mutations in the MTHFR gene lead to accumulation of homocysteine in the body which increases risk for cardiovascular disease.

The most important nutrients that help lower homocysteine levels are folate, vitamins B12, B6 and B2, zinc and trimethylglycine (TMG).

Please refer to the supplementary table for specific food and nutrient recommendations.

LAST NAME	FIRST NAME	MIDDLE NAME	GENDER	DATE OF BIRTH	ACCESSION ID
CARDIAX	DEMO		MALE	1996-04-13	1809250267

1q25

R021D
C/C
Homozygous
Mutant

GLUL gene on chromosome 1q25 increases Congestive Heart Disease in Diabetes Mellitus by reducing expression of glutamine synthase which converts glutamic acid to glutamine. It is important in cell proliferation and signaling, inhibition of apoptosis, insulin and glucose metabolism, incretin, enterocyte health, and endothelial cell metabolism. The “C” mutation is significantly associated with the primary composite end point of death from cardiovascular causes, nonfatal Myocardial Infarction, nonfatal stroke or hospitalization for angina among individuals with no history of cardiovascular disease (CVD).

Increased risk for

Coronary Heart Disease (especially in diabetics).

Potential Risk Mitigation Choices

This C mutation has been associated with an increased effect in diabetics.

Tight control of blood glucose is an important clinical target.

Consider glutathione precursors for treatment.

Diet changes should focus on an increase in fiber and reduced intake of refined sugar.

Please refer to the supplementary table for specific food and nutrient recommendations.

4q25

R733D
T/T
Homozygous
Mutant

Increased Risk of

Atrial Fibrillation

Ischemic Stroke

Potential Risk Mitigation Choices

Excess sodium intake has been linked to hypertension in some individuals. This can increase risk for atrial fibrillation.

Consider limiting sodium intake to <1500mg/day.

To reduce risk of stroke, limit intake of saturated and trans fats, and increase intake of monounsaturated fats from high-omega-3 source fish, such as salmon.

Please refer to the supplementary table for specific food and nutrient recommendations.

LAST NAME	FIRST NAME	MIDDLE NAME	GENDER	DATE OF BIRTH	ACCESSION ID
CARDIAX	DEMO		MALE	1996-04-13	1809250267

9p21

R274D G/G Homozygous Mutant	**Increased Risk of** Inflammation Plaque rupture Thrombosis Abdominal Aortic Aneurysm Atherosclerotic cardiovascular disease Coronary Heart Disease Myocardial Infarction Diabetes Mellitus Insulin Resistance
R206D G/G Homozygous Mutant	**Increased Risk of** Inflammation Plaque rupture Thrombosis Abdominal Aortic Aneurysm Atherosclerotic cardiovascular disease Coronary Heart Disease Myocardial Infarction Diabetes Mellitus Insulin Resistance

Potential Risk Mitigation Choices

Aggressive early detection, prevention and risk factor control is essential.

The following heart healthy lifestyle changes are recommended to increase HDL cholesterol levels: increase intake of monounsaturated fats, daily cardiovascular exercise, fruits high in fiber, and increased intake of fatty fish high in omega-3 fatty acids.

Additional omega-3 plant sources including flax and chia seeds improve HDL levels.

Please refer to the supplementary table for specific food and nutrient recommendations.

LAST NAME	FIRST NAME	MIDDLE NAME	GENDER	DATE OF BIRTH	ACCESSION ID
CARDIAX	DEMO		MALE	1996-04-13	1809250267

Moderate Risk:

Gene	Analyte	Potential Risk
ApoC3	R449D A/G Heterozygous	**Moderate risk of** Dyslipidemia Coronary Heart Disease.
CYP4A11	R742D C/T Heterozygous	The gene encodes an enzyme that converts arachidonic acid to 20-hydroxyeicosatetraenoic acid, a metabolite involved in blood pressure regulation in humans. Higher 20-HETE increases BP, causes vasoconstriction and natriuresis. **Moderate risk for** Hypertension
Apo A2	R082D C/T Heterozygous	**Moderate risk for** Obesity & Dislipidemia Heart disease

Potential Risk Mitigation Choices

Reducing lipid levels (Total-C and LDL-C) are the goal for treatments of this condition.

Exercise, red wine and increased intake of monounsaturated fatty acids can help increase HDL levels, which will help reduce LDL-C.

Exercise >150 minutes per week.

Omega 3 supplementation has been shown to improve HDL. Whole food, plant based, high fiber diets have also been shown to reduce LDL-C.

Alternatively, cholesterol lowering medication can be considered.

Please refer to the supplementary table for specific food and nutrient recommendations.

Potential Risk Mitigation Choices

Amiloride is used with other diuretics as listed in the supplementary form to treat hypertension, heart failure, or extra fluid in the body (edema).

Amiloride also helps to treat or prevent low blood potassium levels caused by other diuretics.

Lowering high blood pressure helps prevent strokes, heart attacks, and kidney problems.

Potential Risk Mitigation Choices

Reduced intake of high saturated and trans fat foods increases HDL-C and reduces LDL-C.

A whole foods plant based diet, low in unhealthy fats, may help improve lipid levels. Exercise >150 minutes per week, may increase HDL levels. Higher HDL levels help remove bad cholesterol from the body.

Emphasize nuts, fish and other foods containing omega-3 fatty acids to improve the ratio of LDL cholesterol to HDL cholesterol.

Moderate use of alcohol has been linked with higher levels of HDL in some individuals.

Please refer to the supplementary table for specific food and nutrient recommendations.

LAST NAME	FIRST NAME	MIDDLE NAME	GENDER	DATE OF BIRTH	ACCESSION ID
CARDIAX	DEMO		MALE	1996-04-13	1809250267

GSHPx

R450D
C/T
Heterozygous

Increased Glutathione Peroxidase (GSH-Px) lowers BP, reduces MI, LVH and CHF.

GSH-Px confers more cell, tissue and organ protection than SOD (superoxide dismutase) or catalase, or the combination of both.

The C/T allele of Glutathione peroxidase polymorphism decreases its enzyme activity leading to moderate risk for

CHD

MI

Hypertension

Potential Risk Mitigation Choices

Polymorphisms in glutathione peroxidase have been shown to increase the risk of cardiovascular disease due to decreased GSH-Px enzyme activity.

Supplementation of selenium and glutathione is recommended.

Food and specific nutrients as listed in the supplementary form can also be considered to reduce hypertension, CHD and MI risk.

CYP11B2

R998D
C/T
Heterozygous

The CYP11B2 gene is associated with Aldosterone Synthase (Asyn) transcription, the C allele has been found to reduce Asyn transcription. T allele binds to steroidogenic factor (SF-1) with lower affinity than the C allele which results increased expression of the enzyme.

Aldosterone levels: lowest with CC (0.08 frequency), then CT (.53 frequency) and highest with TT (.39 frequency). T allele leads to higher blood pressure

30% of hypertensive patients with Resistant Hypertension have elevated plasma aldosterone concentration and intravascular volume expansion.

Increased Risk of

Hypertension

Aldosterone Enzyme Disorder

Potential Risk Mitigation Choices

Polymorphisms in this gene control aldosterone levels. Higher aldosterone leads to higher blood pressure.

Spironolactone is considered the best treatment option in these patients (ACEI or ARB), especially in resistant hypertensive patients. Aldosterone breakthrough on ARB and ACEI may be more common with the TT allele.

TT variant results in highest aldosterone levels followed by CT, and then CC.

Low sodium, heart healthy diets such as DASH and Mediterranean and selective angiotensin receptor antagonists have been shown to help reduce hypertension.

Please refer to the supplementary table for specific food and nutrient recommendations.

LAST NAME	FIRST NAME	MIDDLE NAME	GENDER	DATE OF BIRTH	ACCESSION ID
CARDIAX	DEMO		MALE	1996-04-13	1809250267

MTHFR

677C>T
C/T
Heterozygous

Moderate Risk of

Endothelial dysfunction
Hypertension
Thrombosis
CVD
Coronary Heart Disease
Myocardial Infarction
Hyperhomocysteinemia
Dementia
Depression

Potential Risk Mitigation Choices

Methylation supplementation is recommended for individuals who carry the mutations of the MTHFR genes.

Mutations in the MTHFR gene lead to accumulation of homocysteine in the body which increases risk for cardiovascular disease.

The most important nutrients that help lower homocysteine levels are folate, vitamins B12, B6 and B2, zinc and trimethylglycine (TMG).

Please refer to the supplementary table for specific food and nutrient recommendations.

COMT

R680D
A/G
Heterozygous

Moderate Risk of

Hypertension
Coronary Heart Disease
Myocardial Infarction

The A mutant leads to replacement of Valine amino acid with Methionine in the COMT enzyme at positions 158 and 108 in the membrane form and secreted form respectively. The protein with a Methionine at position 158/108 has a 3-4x reduced activity, which results in norepinephrine being broken down more slowly

High level of norepinephrine leads to prolonged activation of the sympathetic nervous system, which is believed to be the root cause for aggression, anger and hostility. It also contributes to increased risk for hypertension.

Potential Risk Mitigation Choices

Use of vitamin E and aspirin should be based on COMT polymorphisms.

Individuals who are homozygous for the enzyme's high-activity valine form, the “val/vals,” have been shown to have lower levels of catecholamines compared to individuals who are homozygous for the enzyme's low-activity methionine form; the “met/mets,” the val/met heterozygotes are in between.

Give aspirin or vitamin E to met/met (A/A), but neither to val/met(G/A) or val/val (G/G).

Please refer to the supplementary table for specific food and nutrient recommendations.

LAST NAME	FIRST NAME	MIDDLE NAME	GENDER	DATE OF BIRTH	ACCESSION ID
CARDIAX	DEMO		MALE	1996-04-13	1809250267

6p24.1

R713D
C/T
Heterozygous

R453D
C/G
Heterozygous

Moderate susceptibility for

Venous Thrombosis

Coronary Heart Disease

Potential Risk Mitigation Choices

Early identification, prevention and risk factor control is extremely important in the context of heart disease.

Emphasize a lower fat, higher fiber diet based on whole plant sources and unrefined foods.

High fiber, low-fat diets, combined with exercise, reduce the risk of Venous Thrombosis.

Please refer to the supplementary table for specific food and nutrient recommendations.

9p21

R278D
A/G
Heterozygous

Moderate risk for

Inflammation

Plaque rupture

Thrombosis

Abdominal Aortic Aneurysm

Atherosclerotic cardiovascular disease

Coronary Heart Disease

Myocardial Infarction

Diabetes Mellitus

Insulin Resistance

Potential Risk Mitigation Choices

Aggressive early detection, prevention and risk factor control is essential.

The following heart healthy lifestyle changes are recommended to increase HDL cholesterol levels: increase intake of monounsaturated fats, daily cardiovascular exercise, fruits high in fiber, and increased intake of fatty fish high in omega-3 fatty acids.

Additional omega-3 plant sources including flax and chia seeds improve HDL levels.

Please refer to the supplementary table for specific food and nutrient recommendations.

LAST NAME	FIRST NAME	MIDDLE NAME	GENDER	DATE OF BIRTH	ACCESSION ID
CARDIAX	DEMO		MALE	1996-04-13	1809250267

Low Risk Genes		
Gene	**Result**	**Potential Risk**
CYP4F2	R622D C/C Homozygous Wild	Normal
Apo A1	R670D G/G Homozygous Wild	Normal
NOS3	R758D C/C Homozygous Wild	Normal
SCARB1	R001D C/C Homozygous Wild	Normal
CYP1A2	R297D C/C Homozygous Wild	Normal
	R551D A/A Homozygous Wild	Fast caffeine metabolizer Those who are fast metabolizers have reduced risk of a heart attack and Hypertension if they consume the caffeine equivalent of at least one cup of coffee per day, compared to no daily caffeine consumption. Fast metabolizers have lower blood pressure and lower risk of Myocardial Infarction. About 40% of the population are fast metabolizers.
ACE I/D	R994D I/I Homozygous Wild	Normal
4q25	R464D G/G Homozygous Wild	Normal
9p21	R207D A/A Homozygous Wild	Normal

NATURAL FOODS CATEGORIZED BY DIETARY CLASS

Dietary Class (Alphabetical listing)	Foods and ingredients listed by dietary class	Nutrients and other supplements listed by dietary class
Angiotensin converting enzyme inhibitors Expands blood vessels and decreases resistance by lowering levels of angiotensin II, allows blood to flow more easily and makes the heart's work easier or more efficient and used to improve symptoms of cardiovascular conditions including high blood pressure and heart failure.	**Buckwheat** **Cheese** **Egg yolk** **Fish (specific):** Bonito Dried salted fish Fish sauce Sardine muscle/protein Tuna **Garlic** **Gelatin** **Hawthorne berry** **Maize** **Milk products (specific):** Casein Whey (hydrolyzed) **Rapeseed (Canola)** **Sake** **Sea vegetables (kelp)** **Sea weed (Wakame)** **Sorghum** **Soybean** **Sunflower** **Wheat germ (hydrolyzed)** **Zein (corn protein)**	**Melatonin** **Omega-3 fatty acids** **Pomegranate** **Pycnogenol** **Zinc**
Angiotensin receptor blockers	**Celery** **Fiber** **Garlic** **MUFA**	**Coenzyme Q 10** **Gamma linolenic acid** **NAC** **Oleic acid** **Resveratrol** **Potassium** **Taurine** **Vitamin C** **Vitamin B6 (pyridoxine)**
Anticoagulants Helps to prevent harmful clots from forming in the blood vessels and may prevent the clots from becoming larger and causing more serious problems.	**Dong quai** **Feverfew** **Fish oil** **Garlic** **Ginger** **Gingko** **Tree ear mushrooms**	**Vitamin E**

Dietary Class (Alphabetical listing)	Foods and ingredients listed by dietary class	Nutrients and other supplements listed by dietary class
Anti-Inflammatory foods Reduce inflammation and hence the risk for atherosclerosis and Coronary artery disease	**Beets** **Blueberries** **Bok Choy** **Broccoli** **Celery** **Chia Seeds** **Flax Seeds** **Pineapple** **Salmon** **Turmeric** **Walnuts**	**Chromium** **Folate** **Magnesium** **Manganese** **Omega 3** **Omega 6** **Phosphorous** **Potassium** **Selenium** **Vitamin A** **Vitamin B12** **Vitamin C** **Vitamin D** **Vitamin K**
Anti-platelet agents Keeps blood clots from forming by preventing blood platelets from sticking together.	**Beverages** Pineapple Juice Tea - both black and green tea Wine – white and red **Fruits** Blueberries Cherries Cranberries Grapes Nectarine Oranges Strawberries Tangerines **Spices** Cayenne Cinnamon Curry powder Dill Garam masala Ginger Oregano Paprika Peppermint Thyme Turmeric	
Beta blockers (Also known as Beta-Adrenergic Blocking Agents)Decreases the heart rate and cardiac output, which lowers blood pressure and makes the heart beat more slowly and with less force.Used to lower blood pressure.Used with therapy for cardiac arrhythmias (abnormal heart rhythms) and in treating chest pain (angina).	**Bananas** **Broccoli** **Chamomile Tea** **Hawthorne berry** **Oatmeal** **Passionflower** **Pomegranate** **Potatoes** **Tuna** **Turkey** **Valerian Root**	

Dietary Class (Alphabetical listing)	Foods and ingredients listed by dietary class	Nutrients and other supplements listed by dietary class
Calcium channel blockers Interrupts the movement of calcium into the cells of the heart and blood vessels as they are Magnesium rich. May decrease the heart's pumping strength and relax blood vessels. Used to treat high blood pressure, chest pain (angina) caused by reduced blood supply to the heart muscle and some arrhythmias (abnormal heart rhythms).	**Almonds** **Artichokes** **Beet greens** **Black beans** **Brazil nuts** **Broccoli** **Buckwheat** **Cashew** **Celery** **Garlic** **Hazelnut** **Hawthorn berry** **MUFA** **Raw barley** **Raw oat** **Soybeans** **Spinach** **Squash** **Swiss chard** **Wheat bran**	**Alpha lipoic acid** **Calcium** **Magnesium** **N-acetyl cysteine** **Oleic acid** **Omega-3 fatty acids:** Eicosapentaenoic acid Docosahexaenoic acid **Taurine** **Vitamin B6** **Vitamin C** **Vitamin E**
Central alpha agonists (reduce sympathetic nervous system activity)	**Celery** **Fiber** **Garlic** **Protein**	**Coenzyme Q 10** **Gamma linolenic acid** **Potassium** **Restriction of sodium** **Taurine** **Vitamin B6** **Vitamin C** **Zinc**
Cholesterol Control Used to lower LDL ("bad") cholesterol.	**Statin containing foods** Apples Bananas Beets Blueberries Brussels sprouts Cabbage Cauliflower Cherries Legumes Onions Oranges Oyster mushrooms Pears Red yeast rice Tempeh esp Red rice tempeh Wheat germ Yams	

Dietary Class (Alphabetical listing)	Foods and ingredients listed by dietary class	Nutrients and other supplements listed by dietary class
Direct Renin Inhibitors		**Vitamin D**
Direct vasodilators Vasodilation is the relaxing of the arteries, a beneficial effect that can help to lower blood pressure. Relaxes blood vessels and increases the supply of blood and oxygen to the heart while reducing its workload. Available in pill form, chewable tablets and as a topical application (cream).	**3-n-butylphthalide** **Celery** **Citrulline Based** Cantaloupes Watermelons **Cooking oils with monounsaturated fats** **Fiber** **Garlic** **Hydrogen sulfide based Garlic** **MUFA** **Nitrates** Beets Spinach **Soy**	**Alpha linolenic acid** **Arginine** **Calcium** **Flavonoids** **Magnesium** **Omega-3 fatty acids** **Potassium** **Taurine** **Vitamin C** **Vitamin E**
Diuretics	**Celery** **Hawthorn berry** **Protein**	**Calcium** **Coenzyme Q 10** **Fiber** **Gamma linolenic acid** **L-carnitine** **Magnesium** **Potassium** **Taurine** **Vitamin B6** **Vitamin C** **Vitamin E :** high gamma/delta tocopherols and tocotrienols.
Methylation Supplementation	**Dark, leafy greens** Bok choy Escarole Kale Mustard Spinach	**Betaine** **Folate** **Vitamin B6** **Vitamin B12** **Zinc**

Diet & Supplement Choices – Hypertension		
Intervention category	Therapeutic intervention	Daily intake
Diet characteristics	**DASH I, DASH II-Na+ or PREMIER diet**	**Diet type**
	Sodium restriction	1500mg
	Potassium	5000mg
	Potassium/sodium ratio	>3:1
	Magnesium	1000mg
	Zinc	50mg
Macronutrients	**Protein Total intake from non-animal sources, organic lean or wild animal protein, or coldwater fish**	**30% of total calories, which 1.5-1.8 gram/kg body weight**
	Whey protein	30 grams
	Soy protein (fermented sources are preferred)	30 grams
	Sardine muscle concentrate extract	3 grams
	Milk peptides (VPP and IPP)	30-60 mg
	Fat	**30% of total calories**
	Omega-3 fatty acids	2-3 grams
	Omega-6 fatty acids	1 gram
	Omega-9 fatty acids	2-4 tablespoons of olive or nut oil or 10-20 olives
	Saturated fatty acids from wild game, bison, or other lean meat	<10% total calories
	Polyunsaturated to saturated fat ratio	>2.0
	Omega 3 to omega 6 ratio	1.1-1.2
	Synthetic trans fatty acids	None (completely remove from diet)
	Nuts in variety	Ad libidum
	Carbohydrates as primarily complex carbohydrates and fiber	**40% of total calories**
	Oatmeal or	60 grams
	Oatbran or	40 grams
	Beta-glucan or	3 grams
	Psyllium	7 grams
Specific foods	**Garlic as fresh cloves or aged Kyolic garlic**	**4 fresh cloves (4 grams) or 600mg aged garlic taken twice daily**
	Sea vegetables, specifically dried wakame	**3.0-3.5grams**
	Lycopene as tomato products, guava, watermelon, apricots, pink grapefruit, papaya or supplements	**10-20mg**
	Dark chocolate	**100 grams**
	Pomegranate juice or seeds	**8 ounces or one cup**
	Sesame	**60 mg sesamin or 2.5 grams sesame meal**

Intervention category	Therapeutic intervention	Daily intake
Exercise	**Aerobic**	**20 minutes daily at 4200 KJ/week**
	Resistance	**40 minutes per day**
Weight reduction	**Body mass index <25** **Waist circumference:** <35 inches for women <40 inches for men **Total body fat:** <30% for women <24% for men	**Lose 1-2 pounds per week and increasing the proportion of lean muscle**
Other lifestyle recommendations	**Alcohol restriction:** Among the choice of alcohol, red wine is preferred due to its vasoactive phytonutrients.	**< 20 grams/day** **Wine <10 ounces** **Beer < 24 ounces** **Liquor <2 ounces**
	Caffeine restriction or elimination depending on CYP 450 type	**< 100mg/day**
	Tobacco and smoking	**Stop**
Medical considerations	**Medications which may increase blood pressure.**	**Minimize use when possible, such as by using disease-specific nutritional interventions**
Supplemental foods and nutrients	**Alpha lipoic acid with biotin**	**100-200 mg twice daily**
	Amino acids: **Arginine**	**5 grams twice daily**
	Carnitine	**1 to 2 grams twice daily**
	Taurine	**1 to 3 grams twice daily**
	Chlorogenic acids	**150-200mg**
	Coenzyme Q 10	**100mg once to twice daily**
	Grape Seed Extract	**300mg**
	Hawthorne extract	**500 mg twice daily**
	Melatonin	**2.5 mg**
	N acetyl cysteine (NAC)	**500 mg twice daily**
	Olive Leaf Extract (oleuropein)	**500 mg twice daily**
	Pycnogenol	**200 mg**
	Quercetin	**500 mg twice daily**
	Resveratrol (trans)	**250mg**
	Vitamin B6	**100mg once to twice daily**
	Vitamin C	**250-500mg twice daily**
	Vitamin D3	**Dose to raise 25- hydroxyvitamin D serum level to 60ng/ml**
	Vitamin E as mixed tocopherols	**400 IU**

Supplement Choices – Dyslipidemia	
Therapeutic intervention	**Daily intake**
Red yeast rice	2400 to 4800 mg in the evening with food
Plant sterols	2.5 grams daily
Berberine	500 mg once to twice daily
Niacin (nicotinic acid B3)	500 to 3000 mg daily as tolerated pretreated with Quercetin, apples, ASA. Take with food and avoid alcohol. Never interrupt therapy.
Omega-3 fatty acids with EPA/DHA at 3/2 ratio	4 grams daily with GLA at 50% of total EPA
Gamma delta tocotrienols	200 mg at bedtime
Aged garlic	Kyolic standardized 600 mg twice daily
Sesame	40 grams daily
Pantethine	450 mg twice daily
MUFA	20 to 40 grams daily (EVOO 4 tablespoons daily)
Lycopene	20 mg daily
Luteolin	100mg daily
Trans resveratrol	250 mg daily
NAC	500 mg twice daily
Carnosine	500 mg twice daily
Citrus bergamot	1000 mg daily
Quercetin	500 mg twice daily
Probiotics standardized	15 to 50 billion organisms twice daily
Curcumin	500-1000 mg twice daily
EGCG	500-1000 mg twice daily or 60-100 ounces of green tea daily
Pomegranate	one cup of seeds or 6 ounces of juice daily

Supplement Choices – Coronary Heart Disease	
Therapeutic intervention	**Daily intake**
Taurine	3 grams twice daily
D-Ribose	5 grams three or four times daily
CoQ10	300mg twice daily
Magnesium chelates	500 to 1000mg twice daily
High potassium diet	5000-10000 mg daily
Carnitine tartrate	3 grams twice daily
R-Lipoic Acid	300-600mg twice daily(pyruvate decarboxylase complex)
Malic Acid	240mg twice daily
Aged Garlic	1200mg daily
Curcumin	500 to 1000mg twice daily
Vitamin C	500mg twice daily
Sesame Oil	200 to 300ml daily
Carnosine	500 to 1000mg daily
Probiotics	Containing Saccharomyces boulardii and others
Vitamin K2 MK7	150ug daily
Omega 3 FA	250 to 500mg daily
Glutathione precursors	NAC 1000mg twice daily, R Lipoic acid extended release 300mg twice daily, whey protein 40 grams daily, selenium 200ug daily
Vitamin D3	5000IU daily
B Vitamins	At least 200mg thiamine daily
Zinc	50 mg daily
Selenium	200ug daily
Trans-Resveratol	250mg daily
Creatine	2000mg daily
Quercetin	1000mg twice daily
Sauna Treatments	

References

GENE	REFERENCE/ABSTRACT	RATING
9p21	**Shen GQ1, Rao S, Martinelli N, Li L, Olivieri O, Corrocher R, Abdullah KG, Hazen SL, Smith J, Barnard J, Plow EF, Girelli D, Wang QK.Association between four SNPs on chromosome 9p21 and myocardial infarction is replicated in an Italian population.** Genome-wide single nucleotide polymorphism (SNP) association studies recently identified four SNPs (rs10757274, rs2383206, rs2383207, and rs10757278) on chromosome 9p21 were associated with myocardial infarction (MI) with odd ratio of 1.24, 1.31, 1.26, and 1.28.	★★★★★
	Helgadottir A1, Thorleifsson G, Magnusson KP, Grétarsdottir S, Steinthorsdottir V, Manolescu A, Jones GT, Rinkel GJ, Blankensteijn JD, Ronkainen A, Jääskeläinen JE, Kyo Y, Lenk GM, Sakalihasan N, Kostulas K, Gottsäter A, Flex A, Stefansson H, Hansen T, Andersen G, Weinsheimer S, Borch-Johnsen K, Jorgensen T, Shah SH, Quyyumi AA, Granger CB, Reilly MP, Austin H, Levey AI, Vaccarino V, Palsdottir E, Walters GB, Jonsdottir T, Snorradottir S, Magnusdottir D, Gudmundsson G, Ferrell RE, Sveinbjornsdottir S, Hernesniemi J, Niemelä M, Limet R, Andersen K, Sigurdsson G, Benediktsson R, Verhoeven EL, Teijink JA, Grobbee DE, Rader DJ, Collier DA, Pedersen O, Pola R, Hillert J, Lindblad B, Valdimarsson EM, Magnadottir HB, Wijmenga C, Tromp G, Baas AF, Ruigrok YM, van Rij AM, Kuivaniemi H, Powell JT, Matthiasson SE, Gulcher JR, Thorgeirsson G, Kong A, Thorsteinsdottir U, Stefansson K.The same sequence variant on 9p21 associates with myocardial infarction, abdominal aortic aneurysm and intracranial aneurysm. Study population included 16732 controls, 2836 individuals diagnosed with Abdominal Aortic Aneurysm, Results indicate that rs10757278-G is associated with Abdominal Aortic Aneurysm has an odd ratio of 1.31.	★★★★★
6p24.1	**Morange PE, Bezemer I, Saut N, Bare L, Burgos G, Brocheton J, Durand H, Biron-Andreani C, Schved JF, Pernod G, Galan P, Drouet L, Zelenika D, Germain M, Nicaud V, Heath S, Ninio E, Delluc A, Münzel T, Zeller T, Brand-Herrmann SM, Alessi MC, Tiret L, Lathrop M, Cambien F, Blankenberg S, Emmerich J, Trégouët DA, Rosendaal FR. A Follow-Up Study of a Genome-wide Association Scan Identifies a Susceptibility Locus for Venous Thrombosis on Chromosome 6p24.1.** Using a collection of 5862 cases with Venous Thrombosis (VT) and 7112 healthy controls, results indicate that the HIVEP1 locus on chromosome 6p24.1 is a susceptibility locus for VT. The rs169713C allele was associated with an increased risk for VT, with an odds ratio of 1.20.	★★★
4q25	**Gretarsdottir S, Thorleifsson G, Manolescu A, Styrkarsdottir U, Helgadottir A, Gschwendtner A, Kostulas K, Kuhlenbäumer G, Bevan S, Jonsdottir T, Bjarnason H, Saemundsdottir J, Palsson S, Arnar DO, Holm H, Thorgeirsson G, Valdimarsson EM, Sveinbjörnsdottir S, Gieger C, Berger K, Wichmann HE, Hillert J, Markus H, Gulcher JR, Ringelstein EB, Kong A, Dichgans M, Gudbjartsson DF, Thorsteinsdottir U, Stefansson K. Risk variants for atrial fibrillation on chromosome 4q25 associate with ischemic stroke.** In a study comprising of Ischemic stroke patient samples (2,327 patients and 16,760 control subjects), both rs2200733 and rs10033464 associated strongly with cardio embolic stroke (CES) (Odds ratio (OR) 1.52 for rs2200733 and OR of 1.27 for rs10033464). Interestingly, rs2200733 also showed significant association to Ischemic stroke, atrial fibrillation.	★★★★★
COMT	**Hall KT, Nelson CP, Davis RB, Buring JE, Kirsch I, Mittleman MA, Loscalzo J, Samani NJ, Ridker PM, Kaptchuk TJ, Chasman DI. Polymorphisms in catechol-O-methyltransferase modify treatment effects of aspirin on risk of cardiovascular disease.** In this Women's Genome Health Study (WGHS), a large population-based cohort of women with randomized allocation to aspirin or vitamin E were compared with placebo. The result shows that for COMT rs4680 met allele homozygotes, exclusive allocation to aspirin or vitamin E compared with placebo resulted in age-adjusted lower rates of incident CVD of 40% and 47% respectively. In contrast, Val allele homozygotes had higher CVD rates of 85% and 50% respectively.	★★★★
	Htun NC, Miyaki K, Song Y, Ikeda S, Shimbo T, Muramatsu M .Association of the catechol-O-methyl transferase gene Val158Met polymorphism with blood pressure and prevalence of hypertension: interaction with dietary energy intake. Sample study included a total of 735 pateints (mean age, 47 years) who were recruited from two separate occupational cohorts. Met/Met carriers had higher adjusted systolic blood pressure (SBP) (+4.79 mm Hg) and diastolic blood pressure (DBP) (+2.33 mm Hg) than Met/Val or Val/Val carriers. There was a significant association between being a Met/Met carrier and having a higher prevalence of hypertension (odds ratio = 2.448).	★★★★★
ACE I/D	**Moradzadegan A, Vaisi-Raygani A, Nikzamir A, Rahimi Z. Angiotensin converting enzyme insertion/ deletion (I/D) (rs4646994) and Vegf polymorphism (+405G/C; rs2010963) in type II diabetic patients: Association with the risk of coronary artery disease.** In a case–control study of 510 Type II Diabetes Mellitus patients (141 with Coronary Artery Disease (CAD) and 369 without CAD), the crude odds ratio (OR) for the presence of CAD in ID+DD and D allele carriers were 1.98 and 1.55, respectively. Also, adjusted ORs in the presence of normolipidemia and the absence of history of hypertension for the risk of CAD in the either ACE (rs4646994) D allele was 2.08.	★★★★
1q25	**Lu Qi, MD, PhD1,2; Qibin Qi, PhD1; Sabrina Prudente.Association Between a Genetic Variant Related to Glutamic Acid Metabolism and Coronary Heart Disease in Type 2 Diabetes.** A total of 1,517 CHD and 2,671 CHDnegative controls with type 2 diabetes were included in a three stage genomewide analysis. One variant, rs10911021, showed a significant association in all three stages and showed genomewide significance when all three stages were combined, with combined odds ratio (OR) 1.36. No association was found between rs10911021 and CHD for 737 nondiabetic CHD cases and 1,637 nondiabetic CHDnegative controls. This was consistent with results of the interaction analysis, suggesting that the association between this variant and CHD appeared specific for type 2 diabetes patients	★★
ApoE	**Peter W.F. Wilson, Ernst J. Schaefer, Martin G. Larson, Jose M. Ordovas. Apolipoprotein E Alleles and Risk of Coronary Disease.** Summary estimates for the association of 2 and 4 alleles with clinical CHD are based on 9 reports that included 1971 male and 181 female cases compared with a similar number of suitable control subjects. Summary estimates indicate that the relative odds for CHD among persons with the 2 allele were 0.98 (0.85-1.14) for both sexes combined. Information for the 4 allele suggests an association with higher relative odds for CHD among men, women, and both sexes combined with odds of 1.38 for men. Studies further suggest that for 2 allele, fewer LDL particles are produced, LDL catabolism is enhanced, and LDL cholesterol levels are typically reduced.	★★★★
	Qiu C, Kivipelto M, Agüero-Torres H, Winblad B, Fratiglioni L .Risk and protective effects of the APOE gene towards Alzheimer's disease in the Kungsholmen project: variation by age and sex. A community dementia free cohort (n = 985) aged > or =75 years was followed up to detect Alzheimer's disease cases. Compared with APOE 3/3 genotype, the relative risk (RR) of Alzheimer's disease was 1.4 for heterozygous 3/4 allele and 3.1 for homozygous 4/4 allele. The 2 allele was related to a reduced Alzheimer's disease risk mainly in people aged <85 years (Relative Risk (RR) of 0.4). The RR of Alzheimer's disease related to the interaction term of 2 allele by age was 2.4.	★★★★★
MTHFR	**Mansoori N, Tripathi M, Luthra K, Alam R, Lakshmy R, Sharma S, Arulselvi S, Parveen S, Mukhopadhyay AK. MTHFR (677 and 1298) and IL-6-174 G/C genes in pathogenesis of Alzheimer's and vascular dementia and their epistatic interaction.** A total of 250 blood samples collected of patients from Department of Neurology, All India Institute of Medical Sciences (AIIMS) have been analyzed. For rs1801131, CC genotype was associated with elevated levels of plasma homocysteine (p = 0.004) as compared with genotype AA. In Alzheimer's disease (AD), we observed a significant (p = 0.04) association with C alleles of rs1801131. Regression analysis revealed that the presence of both rs1801133 T and rs1800795 C alleles increased the odds of developing AD by 2.5 and vascular dementia (VaD) by 3.7-fold.	★★★★
CYP1A2	**Sulem P, Gudbjartsson DF, Geller F, Prokopenko I, Feenstra B, Aben KK, Franke B, den Heijer M, Kovacs P, Stumvoll M, Mägi R, Yanek LR, Becker LC, Boyd HA, Stacey SN, Walters GB, Jonasdottir A, Thorleifsson G, Holm H, Gudjonsson SA, Rafnar T, Björnsdottir G, Becker DM, Melbye M, Kong A, Tönjes A, Thorgeirsson T, Thorsteinsdottir U, Kiemeney LA, Stefansson K. Sequence variants at CYP1A1–CYP1A2 and AHR associate with coffee consumption.** A study comprising of a meta-analysis of four genome-wide association studies of coffee consumption among coffee drinkers of n=6611. The results indicate polymorphism rs2472297-T is associated with increased coffee consumption. The effects of coffee consumption on health include increased risk of cardiovascular disease and hypertension.	★★★★
	Guessous I, Dobrinas M, Kutalik Z, Pruijm M, Ehret G, Maillard M, Bergmann S, Beckmann JS, Cusi D, Rizzi F, Cappuccio F, Cornuz J, Paccaud F, Mooser V, Gaspoz JM, Waeber G, Burnier M, Vollenweider P, Eap CB, Bochud M. Caffeine intake and CYP1A2 variants associated with high caffeine intake protect non-smokers from hypertension. Four observational (n = 16 719) and one quasi-experimental studies (n = 106) were conducted. Odds ratios for hypertension for rs762551 CC, CA and AA genotypes were 1 (reference), 0.78 and 0.66, respectively. The CYP1A2 rs762551 C allele is associated with lower CYP1A2 enzyme activity. CYP1A2 metabolizes caffeine and is induced by smoking. Higher CYP1A2 activity was linearly associated with lower BP after quitting smoking.	★★★★
SCARB1	**West M, Greason E, Kolmakova A, Jahangiri A, Asztalos B, Pollin TI, Rodriguez A. Scavenger Receptor Class B Type I Protein as an Independent Predictor of High-Density Lipoprotein Cholesterol Levels in Subjects with Hyperalphalipoproteinemia.** . Adult men and women between the ages of 18 and 80 years were recruited from the greater Baltimore, MD, area. Subjects who were carriers of the A allele for the rs4238001 (glycine to serine at position 2) polymorphism [single nucleotide polymorphism (SNP)] had lower scavenger receptor class B, type I (SR-BI) protein levels (P = 0.01).	★★★

GENE	REFERENCE/ABSTRACT	RATING
Corin	**Dries DL, Victor RG, Rame JE, Cooper RS, Wu X, Zhu X, Leonard D, Ho SI, Wu Q, Post W, Drazner MH.Corin Gene Minor Allele Defined by 2 Missense Mutations Is Common in Blacks and Associated With High Blood Pressure and Hypertension.** The primary study sample was the Dallas Heart Study (DHS), a multistep probability-based sample of Dallas County residents 18 to 65 years of age which included over 3000 samples. 2 nonsynonymous, non-conservative single nucleotide polymorphisms (Q568P and T555I) were sequenced in near-complete linkage disequilibrium, thus describing a single minor I555 (P568) corin gene allele. The corin I555 (P568) allele remained independently associated with increased risk for prevalent hypertension (odds ratio, 1.63). The corin I555 (P568) allele also was associated with higher systolic blood pressure in subjects not using antihypertensive medication in unadjusted (133.7±20.7 versus 129.4±17.4 mm Hg) and adjusted (132.5±1.6 versus 128.9±0.6 mm Hg) analyses.	★★★★
	J. Eduardo Rame, S. William Tam, Dennis McNamara, Manuel Worcel, Michael L. Sabolinski, Alan Wu, and Daniel L. Dries. Dysfunctional Corin I555 (P568) Allele is Associated with Impaired BNP Processing and Adverse Outcomes in African-Americans with Systolic Heart Failure: Results from the Genetic Risk Assessment in Heart Failure A-HeFT Sub-Study. This is a retrospective study of 354 subjects in the African-America Heart Failure Trial (A-HeFT) Genetic Risk Assessment in Heart Failure (GRAHF) sub-study. It was found that corin I555 (P568) allele was associated with increased risk for death or heart failure hospitalization Risk Ratio of 3.49.	★★★★
CYP11B2	**Takeuchi F, Yamamoto K, Katsuya T, Sugiyama T, Nabika T, Ohnaka K, Yamaguchi S, Takayanagi R, Ogihara T, Kato N. Reevaluation of the association of seven candidate genes with blood pressure and hypertension: a replication study and meta-analysis with a larger sample size.** A total of 19,426 individuals underwent testing for genetic associations with systolic BP (SBP)/diastolic BP (DBP) and 9271 individuals (3460 cases and 5811 controls) underwent testing for genetic associations with dichotomous hypertension. In their study panels, the most significant association was found for CYP11B2 rs1799998 with odd ratio of 1.15.	★★★★
GSHPX	**Ye H, Li X, Wang L, Liao Q, Xu L, Huang Y, Xu L, Xu X, Chen C, Wu H, Le Y, Liu Q, Ye M, Dong C, Duan S. Genetic associations with coronary heart disease: meta-analyses of 12 candidate genetic variants.** The meta-analysis done on a comprehensive literature search for genetic variants involved in the CHD association study showed a significant association between the GPX1 rs1050450 polymorphism and CHD odd ratio=1.61.	★★★
NOS3	**Zhang X, Lynch AI, Davis BR, Ford CE, Boerwinkle E, Eckfeldt JH, Leiendecker-Foster C, Arnett DK. Pharmacogenetic Association of NOS3 Variants with Cardiovascular Disease in Patients with Hypertension: The GenHAT Study.** A clinical study was conducted from hypertensive subjects n=30,280 from a multi-center, double-blind trial and results suggest that for rs3918226, a higher hazard ratio (HR) was found in minor allele carriers for CHD.	★★★★
	Levinsson A, Olin AC, Björck L, Rosengren A, Nyberg F. Nitric oxide synthase (NOS) single nucleotide polymorphisms are associated with coronary heart disease and hypertension in the INTERGENE study. The study consisted of 560 coronary heart disease patients and randomly selected population controls (n=2791) were genotyped at 58 SNPs in the NOS genes. NOS1 SNP rs3782218 showed the most consistent association with coronary heart disease with odds ratio of 0.89.	★★★★
	Ferguson JF, Phillips CM, McMonagle J, Pérez-Martínez P, Shaw DI, Lovegrove JA, Helal O, Defoort C, Gjelstad IM, Drevon CA, Blaak EE, Saris WH, Leszczyska-Goabek I, Kiec-Wilk B, Risérus U, Karlström B, Lopez-Miranda J, Roche HM. NOS3 gene polymorphisms are associated with risk markers of cardiovascular disease, and interact with omega-3 polyunsaturated fatty acids. This study assessed association between NOS3 rs1799983 SNP and cardiovascular disease (CVD), using a case-control study of 450 metabolic syndrome patients and controls. A significant gene–nutrient interaction was observed between the NOS3 rs1799983 SNP and plasma n-3 PUFA status on plasma triacylglycerol (TAG), Where Omega-3 polyunsaturated fatty acids (n-3 PUFA) may protect against the development of cardiovascular disease (CVD).	★★★★
ADR-B2	**Zee RY, Cook NR, Cheng S, Erlich HA, Lindpaintner K, Ridker PM. Polymorphism in the beta2-adrenergic receptor and lipoprotein lipase genes as risk determinants for idiopathic venous thromboembolism: a multilocus, population-based, prospective genetic analysis.** A study of 304 patients found that the Glu27 allele led to increased risk for idiopathic venous thromboembolism; the reported odds ratio was 1.40.	★★★★
	Markus Schürks, Tobias Kurth, Paul M Ridker, Julie E. Buring, and Robert Y. L. Zee. Association between polymorphisms in the 2-adrenergic receptor gene with myocardial infarction and ischemic stroke in women. A clinically well-characterized case-control sample that included 294 cases of ischemic stroke and 286 controls. The presence of the Glu27 allelic variant (G allele for rs1042714) was associated with a significantly increased risk of stroke when assuming a recessive mode of inheritance with odds ratio of 1.68).	★★★★
Apo A1	**Song YY, Gong RR, Zhang Z, Li YH, Fan M, Ou GJ, Fang DZ. Effects of apolipoprotein A1 gene rs670 and rs5069 polymorphisms on the plasma lipid profiles in healthy adolescents with different body mass index.** A study was conducted with 723 adolescents of various BMI. Result shows a carriers of the rs670 mutant polymorphism had significantly higher systolic blood pressure (P=0.017) and blood glucose levels (P=0.009) than the adolescents with the GG genotype.	★★★
Apo A2	**Dolores Corella Donna K. The -256T>C polymorphism in the apolipoprotein A-II gene promoter is associated with body mass index and food intake in the genetics of lipid lowering drugs and diet network study.** A study was conducted for 514 men and 564 women who participated in the Genetics of Lipid Lowering Drugs and Diet Network (GOLDN) study. Odds ratio for obesity in CC individuals compared with T allele carriers was 1.70. Total energy, total fat, and total protein intake were all significantly higher in (C/C) individuals.	★★★★★
CYP4A11	**James V. Gainer, Michael S. Lipkowitz, Chang Yu, Michael R. Waterman, Elliott P. Dawson, Jorge H. Capdevila, Nancy J. Brown and and the AASK Study Group. Association of a CYP4A11 Variant and Blood Pressure in Black Men.** In a study comprising of 732 black Americans, men with the 8590CC genotype had significantly higher systolic BP (CC 156.5 ± 22.6 versus 148.4 ± 24.3 mmHg in CT and TT combined; P = 0.04) and pulse pressure (P = 0.04) at baseline.	★★★
	Bjoern Mayer, Wolfgang Lieb, Anika Götz, Inke R.König, Zouhair Aherrahrou, Annett Thiemig, Stephan Holmer, Christian Hengstenberg, Angela Doering, Hannelore Loewel, Hans-Werner Hense, Heribert Schunkert, Jeanette Erdmann. Association of the T8590C Polymorphism of CYP4A11 With Hypertension in the MONICA Augsburg Echocardiographic Substudy. A MONICA (MONitoring trends and determinants In CArdiovascular disease) survey (n=1397) indicates that individuals with the CC genotype have higher systolic (CC 141.4±3.17 mm Hg versus CT 134.2±0.97 mm Hg and TT 134.3±0.53 mm Hg; P=0.03) and diastolic blood pressure levels (CC 85.4±2.06 mm Hg versus CT 80.3±0.63 mm Hg and TT 80.7±0.34 mm Hg; P=0.02). Accordingly, the odds ratio of the CC genotype versus the CT and TT genotypes for hypertension was 3.31 (95% confidence interval [CI]), 1.38 to 7.96; P=0.016) in the entire study population.	★★★★
CYP4F2	**Zhenyan Fua, Tomohiro Nakayamaa, Naoyuki Satoa, Yoichi Izumic, Yuji Kasamakid, Atsushi Shindod, Masakatsu Ohtad, Masayoshi Somac, Noriko Aoia, Mikano Satoa, Yukio Ozawad, Yitong Mab, Koichi Matsumotoc, Nobutaka Dobae, Shigeaki Hinoharae. A haplotype of the CYP4F2 gene associated with myocardial infarction in Japanese men.** This study assessed associations between the CYP4F2 gene and myocardial infarction (MI), using a haplotype-based case-control study of 234 MI patients and 248 controls. For men, G allele frequency of rs2108622 were significantly higher for MI patients than for controls.	★★
AGTR1	**Wang WY, Zee RY, Morris BJ. Association of angiotensin II type 1 receptor gene polymorphism with essential hypertension. The cohort used consisted of 108 unrelated essential Hypertensive (HT) and 84 normotensive (NT) subjects.** The rs5186(C) allele is associated with increased risk for essential hypertension in Caucasian populations with an odds ratio of 7.3 (homozygote (C/C) compared to (A/C) and (A/A).	★★★★
Apo C3	**The TG and HDL Working Group of the Exome Sequencing Project, National Heart, Lung, and Blood Institute. Loss-of-function mutations in APOC3, triglycerides, and coronary disease.** The data from the Exome sequencing study of 3734 participants showed the rs138326449 (A) is one of the several loss of function mutations in the APOC3 gene associated for a >40% lower average triglyceride level and a corresponding decrease in coronary artery disease.	★★★★

The complete list of references and the summary of performance studies can be found online at www.vibrant-wellness.com or BY CONTACTING CLIENT SERVICES AT +1(866)364-0963.

Cardiax Glossary	
ACE (angiotensin-converting enzyme) inhibitor	A medicine that lowers blood pressure by interfering with the breakdown of a protein-like substance involved in blood pressure regulation.
Abdominal aorta	The portion of the aorta in the abdomen.
Aneurysm	A sac-like protrusion from a blood vessel or the heart, resulting from a weakening of the vessel wall or heart muscle.
Angiotensin II receptor blocker(ARB)	A medicine that lowers blood pressure by blocking the action of angiotensin II, a chemical in the body that causes the blood vessels to tighten (constrict).
Aorta	The largest artery in the body and the main vessel to supply blood from the heart.
Apolipoprotein A-1	Apolipoprotein A1 is a protein that in humans is encoded by the APOA1 gene. It has a specific role in lipid metabolism.
Apolipoprotein B	Apolipoprotein B is a protein that in humans is encoded by the APOB gene. Each Apo B molecule is attached to one LDL particle and is therefore more representative of actual atherogenic particles than LDL, which represents cholesterol content of lipoproteins.
Arrhythmia (or dysrhythmia)	An abnormal heartbeat.
Aspirin	Acetylsalicylic acid; a medicine used to relieve pain, reduce inflammation, and prevent blood clots.
Atherosclerosis	A disease process that leads to the buildup of a waxy substance, called plaque, inside blood vessels.
Beta-blocker	An antihypertensive medicine that limits the activity of epinephrine, a hormone that increases blood pressure.
Blood pressure	The force or pressure exerted by the heart in pumping blood; the pressure of blood in the arteries.
Body mass index (BMI)	A value used to assess how much an individual's body weight departs from what is desirable for a person's height. BMI is calculated using a formula of weight in kilograms divided by height in meters squared (BMI =W [kg]/H [m2]).
Cardiomyopathy	A disease of the heart muscle that leads to generalized deterioration of the muscle and its pumping ability.
Cardiovascular (CV)	Pertaining to the heart and blood vessels that make up the circulatory system.
Cardiovascular Disease (CVD)	A general term referring to conditions affecting the heart (cardio) and blood vessels (vascular system). May also simply be called heart disease.
Cholesterol	A waxy, fat-like substance that is found in all cells of the body and is transported in the blood. Limited amounts are essential for the normal development of cell membranes. Excess amounts can lead to coronary artery disease.
Coronary heart disease	Disease of the heart caused by a buildup of atherosclerotic plaque in the coronary arteries that can lead to angina pectoris or heart attack.
Deep vein thrombosis	A blood clot in a deep vein in the calf (DVT).

Diabetes (diabetes mellitus)	A disease in which the body doesn't produce or properly use insulin. Insulin is needed to convert sugar and starch into the energy used in daily life.
Enzyme	A complex chemical capable of speeding up specific biochemical processes in the body.
Fibrillation	Rapid, uncoordinated contractions of individual heart muscle fibers. The heart chamber involved can't contract all at once and pumps blood ineffectively, if at all.
Heart attack	Death of, or damage to, part of the heart muscle caused by a lack of oxygen-rich blood flowing to the heart.
High blood pressure	A chronic increase in blood pressure above its normal range.
High density lipoprotein (HDL)	A component of cholesterol, HDL helps protect against heart disease by promoting cholesterol breakdown and removal from the blood; hence, its nickname "good cholesterol".
Homocysteine	An amino acid (one of the building blocks that makes up a protein) normally found in small amounts in the blood. Too much homocysteine in the blood may promote the buildup of fatty plaque in the arteries. For some people, high homocysteine.
hs-Cardiac Troponin	Cardiac troponins are a marker of all heart muscle damage, not just myocardial infarction, which is the most severe form of heart disorder. They are measured in the blood to differentiate between unstable angina and myocardial infarction (heart attack) in people with chest pain or acute coronary syndrome.
hs-CRP	C-reactive protein (CRP) is a protein that the liver makes when there is inflammation in the body. It's also called a marker of inflammation, and can be measured with an hs-CRP (high-sensitivity C-reactive protein) test. Inflammation is a way for the body to protect itself from injuries or infections, and inflammation can be caused by smoking, high blood pressure, and high blood sugar.
Hypertension	High blood pressure.
Ischemic heart disease	Also called coronary artery disease and coronary heart disease, this term is applied to heart problems caused by narrowing of the coronary arteries, thereby causing a decreased blood supply to the heart.
Ischemic stroke	A type of stroke that is caused by blockage in a blood vessel.
Lipid	A fatty substance that is insoluble (cannot be dissolved) in the blood.
Low density lipoprotein (LDL)	LDL is the "bad" cholesterol. LDL cholesterol binds to receptor sites on macrophages in blood vessel walls inciting several changes to the blood wall which enhance atherosclerotic plaque development.
Lp(a)	Lipoprotein(a) consists of an LDL-like particle and the specific apolipoprotein(a), which is covalently bound to the ApoB of the LDL like particle.

Lp-PLA2	This enzyme plays a role in the inflammation of blood vessels. A build-up of unstable fatty plaque deposits in the arteries can lead to blockages in the blood vessels and may eventually cause a heart attack, brain damage, or stroke.
Myocardial infarction	A heart attack. The damage or death of an area of the heart muscle (myocardium) resulting from a blocked blood supply to the area. The affected tissue dies, injuring the heart. Symptoms include prolonged, intensive chest pain and a decrease.
NT-proBNP	NT-proBNP is primarily secreted from the cardiac ventricular myocytes in response to cardiac stress. NT-proBNP is a useful diagnostic and prognostic tool as elevated levels may indicate the presence of an underlying cardiac disorder.
Obesity	The condition of being significantly overweight. It usually applies when a person is 30% or more over ideal body weight. Obesity puts a strain on the heart and can increase the risk of developing high blood pressure and diabetes.
Oxidized LDL	Oxidized LDL is LDL cholesterol (the “bad” cholesterol) that has been modified by oxidation. Oxidized LDL triggers inflammation leading to the formation of plaque in the arteries, also known as atherosclerosis. Oxidized LDL may also play a role in increasing the amount of triglycerides the body produces, as well as increasing the amount of fat deposited by the body. In turn, fat tissue can enhance the oxidation of LDL, creating a vicious cycle.
Plaque	A deposit of fatty (and other) substances in the inner lining of the artery wall characteristic of atherosclerosis.
sdLDL	Small dense low-density lipoprotein transports cholesterol and triglycerides throughout the body. The smaller the particles, the more likely it is that they will get “stuck” in the artery wall, thus forming a build-up.
Stroke	A sudden disruption of blood flow to the brain, either by a clot or a leak in a blood vessel.
Tachycardia	A type of arrhythmia that begins in the heart's upper chambers (the atria) and causes a very fast heart rate of 160 to 200 beats a minute. A resting heart rate is normally 60 to 100 beats a minute.
Thrombosis	A blood clot that forms inside the blood vessel or cavity of the heart.
Triglyceride	The most common fatty substance found in the blood; normally stored as an energy source in fat tissue. High triglyceride levels may thicken the blood and make a person more susceptible to clot formation. High triglyceride levels tend to accompany.
Vasodilators	Any medicine that dilates (widens) the arteries.

Test Risk and Limitations

Cardiax testing is performed at Vibrant America, a CLIA certified laboratory, and utilizes ISO-13485 developed technology. However, laboratory error can occur, which might lead to incorrect results. Some of them may include sample mislabeling or contamination, operational error or failure to obtain data for certain proteins. Vibrant's laboratory may need a second sample to complete the testing.

Vibrant America has effective procedures in place to protect against technical and operational problems. However, such problems may still occur and examples include failure to obtain the result for a specific protein due to circumstances beyond Vibrant's control. Vibrant may re-test a sample in order to obtain these results but upon re-testing the results may still not be obtained. As with all medical laboratory testing, there is a small chance that the laboratory could report incorrect results. A tested individual may wish to pursue further testing to verify any results.

Tested individuals should not change their diet, physical activity, or any medical treatments they are currently using based on genetic testing results without consulting their personal health care provider. The risk factors for CardiaX are based on selected peer reviewed scientific research findings with significant strength as deemed by the Hypertension Institute of Nashville.

Tested individuals may find their experience is not consistent with Vibrant's selected peer reviewed scientific research findings of relative improvement for study groups. The science in this area is still developing and many personal health factors affect diet and health. Since subjects in the scientific studies referenced in this report may have had personal health and other factors different from those of tested individuals, results from these studies may not be representative of the results experienced by tested individuals. Further, some recommendations may or may not be attainable, depending on the tested individuals' physical ability or other personal health factors.

A limitation of this testing is that most scientific studies have been performed in Caucasian populations only. The interpretations and recommendations are done in the context of Caucasian studies, but the results may or may not be relevant to tested individuals of different or mixed ethnicities. The association between genetic mutations and the information within this report is an active area of scientific research, and future scientific discoveries might alter our understanding of how this information is related to your health and disease conditions.

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