



CARDIAC HEALTH PANEL

Healthcare Professional Information

The Kashi Cardiac Panel gives insight into how a patient's genetic predisposition to cardiac problems can help healthcare providers optimize diagnosis and treatment.

Cardiovascular disease is a leading contributor to morbidity and mortality, with 17.3 million deaths annually worldwide.¹ Cardiovascular disease – which includes coronary heart disease, cerebrovascular disease, peripheral artery disease, and atherosclerosis – is heavily influenced by factors such as insulin resistance, hypertension, dyslipidemia, inflammation, and coagulation properties. Many of these factors can be mitigated by lifestyle changes including smoking cessation, increasing aerobic exercise, and eating a well-balanced diet. In cases where family history of cardiovascular disease is prevalent, medications are needed to better manage health outcomes. And in some patients, lifestyle and medication are still not enough and greater intervention is necessary.

Clinical Utility:

The Kashi Cardiac Health Panel is designed to highlight confounding factors barring appropriate cardiovascular risk reduction in patients. The panel focuses on eight genetic markers affecting hypertension, total cholesterol, LDL (low-density lipoproteins) and HDL (high-density lipoproteins) cholesterol, triglycerides, thrombotic risk, homocysteinemia, insulin resistance, and statin-induced myopathy risk.

Genetic Markers Included:

9p21 – The genetic marker 9p21 is strongly associated with coronary artery disease.² Researchers believe that mutations in this region may affect uncontrolled cell proliferation leading to atherosclerosis, and eventually coronary artery disease.³ Carrying one variant allele increases the risk of coronary artery disease by 25 percent, with the risk doubling in a person with two of these variant alleles.⁴

AGT – Angiotensinogen (AGT) is a protein produced by the liver, which plays a role in the renin-angiotensin-aldosterone system (RAAS).¹ This system is crucial for maintaining blood pressure and cardiovascular homeostasis, and is a target of many antihypertensive drugs.² A hyperactive RAAS resulting from genetic variants, in addition to environmental factors, can lead to coronary artery disease.⁵

APOE - Apolipoprotein E (APOE) is a lipid/protein complex associated with chylomicron formation and the transport of dietary lipids via binding of the LDL (low-density lipoprotein) receptor.² APOE is synthesized mainly in the liver, with a small amount of synthesis occurring in other organs such as the brain. There are three alleles of the APOE gene: E2, E3, and E4.⁷ E2 is a protective allele, and individuals with this variant have a reduced risk of coronary disease. E3 is considered the normal variant of APOE and not associated with any altered risk of cholesterol management. E4 is the risk allele and is associated with increased cholesterol levels⁶, as well as coronary disease⁷, myocardial infarction,⁶ stroke,⁸ and Alzheimers disease.⁹

PURPOSE OF THE CARDIAC HEALTH GENETIC PANEL

- Evaluate risk factors for developing cardiovascular disease
- Identify barriers to effective blood pressure and cholesterol treatments
- Determine risk for statin-induced myopathy

STRONG CANDIDATES FOR THE KASHI CARDIAC HEALTH PANEL INCLUDE PATIENTS WITH:

- Treatment-resistant hypertension
- Poor control over cholesterol levels
- Personal history of angina, DVT, PE, CHF, MI or CVA
- Introduction of new statin medications
- Family history of cardiovascular disease
- Stroke or heart disease in the young
- Idiopathic disease

TURN AROUND TIME:



eNOS/NOS3 – Nitric oxide synthase (NOS) exists in three forms: neuronal, inducible, and endothelial. The form predominantly associated with cardiovascular health is the endothelial form, known as eNOS or NOS3.¹⁰ The eNOS/NOS3 gene regulates vascular nitric oxide production, which helps to regulate vasodilation, vascular repair, platelet aggregation and adhesion, reduction of vascular smooth muscle proliferation, and oxidation of low-density lipoprotein (LDL) particles leading to atherosclerotic plaques. The homozygous variant of eNOS/NOS3 is associated with decreased nitric oxide production and a higher rate of endothelial dysfunction,¹⁰ leading to an increased risk of hypertension,¹¹ myocardial infarction,¹² and stroke.¹³

Factor II (Prothrombin) – Single nucleotide polymorphisms (SNPs) affecting the coagulation cascade have been implicated in many cardiovascular ailments, such as venous thrombosis, ischemic stroke, pulmonary embolisms, coronary artery disease, and myocardial infarction.¹⁴⁻¹⁷ Prothrombin is an inherited mutation that increases the likelihood of blood clot formation.¹⁵ The variant allele of the prothrombin gene significantly elevates thrombin generation, and increases risk for coronary disease,¹⁶ as well as embolisms.¹⁷

Factor V Leiden – Factor V is part of the coagulation cascade, a multi-tiered interaction of proteins and co-factors responsible for proper blood clotting.¹⁸ Factor V is degraded by activated protein C in the absence of hemostasis. A mutation in this gene increases the protein's resistance to degradation, thereby increasing the risk of venous thrombosis and thromboembolisms.

MTHFR – Methylene tetrahydrofolate reductase (MTHFR) is an enzyme that helps convert folate into the specific form of 5-methyl-tetrahydrofolate. The key metabolic role of this form of folate is to aid homocysteine conversion to methionine.¹⁹ Two common mutations in the MTHFR gene (C677T and A1298C) can result in reduced enzyme functionality,²⁰ and may contribute to increased levels of homocysteine, a known risk factor for heart disease,²¹ atherosclerosis and venous thrombosis.²²

SLCO1B1 – The SLCO1B1 gene encodes a transporter that brings statin medications to the main tissues of the liver.²³ Individuals who carry one or two copies of the variant allele have a reduced response to treatment for low-density lipoprotein (LDL) cholesterol (a risk factor for cardiac health), and with too much statin medication in the liver, an increased risk of statin-induced myopathy.^{23,24}

Tying it all Together

The genetic markers included in the Cardiac Health Panel have been rigorously analyzed by our experienced researchers. It is Kashi's mission to provide healthcare providers with a deeper understanding of the genetic basis of their patients' cardiac health, to provide more timely and effective care.

References:

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