# CV Health Plus Genomics



63 Zillicoa Street Asheville, NC 28801 © Genova Diagnostics

Patient: **SAMPLE** 

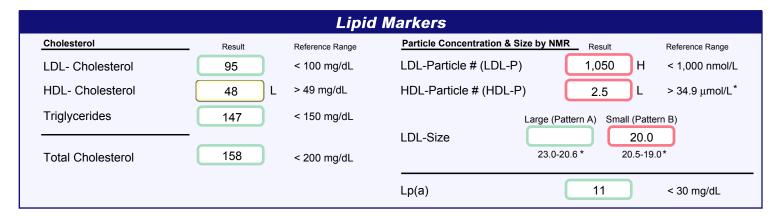
**PATIENT** 

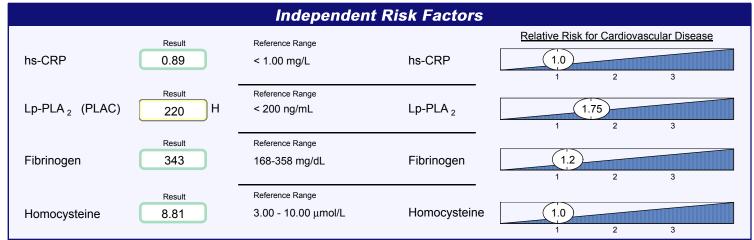
DOB: November 25, 1962

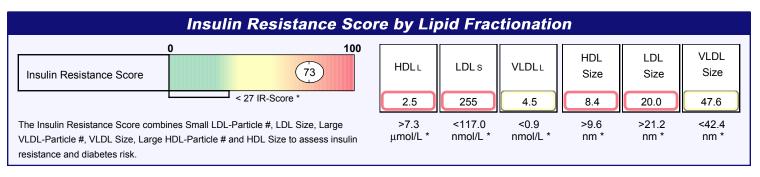
Sex: F MRN:

#### **Order Number:**

Completed: October 14, 2009 Received: October 9, 2009 Collected: October 8, 2009









Percentiles Apply to Biomarkers indicated with \* and are performed using NMR technology.

Optimal Either 0-25th or 75-100th percentile based on reference population.

Borderline 25-75th Percentile

Abnormal Inverse of Optimal (0-25th or 75-100th percentile distribution)

### Apo E

# Apolipoprotein E: CHOLESTEROL REGULATION

### Location:

Chromosome 19

### **APOE**

APO E2: cys / cys APO E3: cys / arg APO E4: arg / arg

## Your Genotype:

3



The two SNPs lead to 3 possible variants for each chromosome, known as ApoE2, E3, & E4.

Apolipoprotein E (Apo E) plays a key role in lipid metabolism by helping to remove dietary cholesterol (chylomicrons and VLDL) from the bloodstream.

### **Health Implications**

- · The APO E3/4 genotype is the second most prevalent after E3/3 and accounts for >25% in most populations
- · APO E4 confers a tendency toward higher total- and LDL-cholesterol and lower HDL-C
- · Risk is also increased for atherosclerosis, myocardial infarction, stroke, and osteoporosis, as well as toxicity by heavy metals such as lead and mercury

### **Treatment Options**

- · Restriction of saturated fat and cholesterol lowers total- and LDL cholesterol the most effectively in E4 individuals
- Avoid smoking and minimize high-glycemic index foods, both of which augment E4-associated risk of coronary heart disease
- · Reduce excess weight, which synergizes with effects of E4 on insulin and lipids
- · Fish oils and exercise should improve the lipid profile, dietary fiber only moderately so
- · Alcohol may raise LDL-C in men (neutral effect in women)
- · Cholesterol responds only slightly to statin drugs in E4 carriers (especially in men)
- · Estrogen therapy is particularly efficacious for both cholesterol and bone in postmenopausal E4 carriers
- · Consider vitamin K supplementation for bone protection

### **MTHFR**

# 5,10-methyltetrahydrofolate reductase: METHYLAT/ON

### Location:

Chromosome 1

C677T

Your Genotype:





# A1298C Your Genotype:



5,10-methylenetetrahydrofolate reductase (MTHFR) is a key enzyme in folate metabolism, facilitating the formation of methyltetrahydrofolate, a required cofactor in the remethylation of homocysteine (Hcy) to methionine.

#### **Health Implications**

- · Homozygosity for 677 (+/+) results in 60-70% reduction in MTHFR enzyme activity
- Increased risk of high homocysteine, esp. if low levels of B2, B6, B12, or folate
- Possible methylation impairment, including disrupted neurotransmitter metabolism and synthesis of DNA, carnitine and coenzyme Q10
- · Increased risk of autism, depression, bipolar disorder, schizophrenia, neural tube defects, congenital heart defects, cardiovascular disease, essential hypertension, atherosclerosis, diabetic retinopathy, osteoporosis
- · Increased risk of cancers of the breast (esp. if prolonged estrogen exposure and/or low folic acid intake), stomach, pancreas (esp. if smoke or drink)
- Possibly decreased risk of colorectal cancer and lung cancer only when high folate status; otherwise increased risk
- · Low levels of vitamins B2, B6, B12, and/or folate often determines the risk of these associated disorders

#### **Treatment Options**

- $\cdot$  Ensure adequate intake of folate-rich green vegetables; folate levels tend to be lower
- · Consider supplementation with folic acid (or folinic acid or 5-methyltetrahydrofolate), riboflavin, B6 (pyridoxal 5-phosphate), B12 (or methylcobalamin), and betaine (trimethylglycine); individuals with this genotype show the best homocysteine response to B-vitamin supplementation
- Easier toxicity and less clinical efficacy with methotrexate chemotherapy

Key on following page

# FACTOR II Factor II (Prothrombin): COAGULATION Factor II is also known as prothrombin, which is converted to its active form, thrombin, and forms the essential part of a blood clot. Location: Chromosome 11 **Health Implications** G20210A · Elevated levels of prothrombin, with 3.8-fold increased risk of venous thrombosis; risk increases 20-fold if Your Genotype: coexisting Factor V Leiden SNP Increased chance of atherosclerosis, atrial fibrillation, and heart attack Slightly increased risk of pre-eclampsia during pregnancy **Treatment Options** Avoid oral contraceptives, HRT, and smoking Platelet activation inhibitors include: fish oils, garlic, onions, ginger, ginkgo biloba, thyme, rosemary, genistein, and aspirin Glycyrrhizin (licorice) inhibits conversion of prothrombin to thrombin

### FACTOR V Factor V (Leiden): COAGULATION Factor V combines with Factor X to convert prothrombin to thrombin, the essential part of a blood clot. Factor Va is held in check by Protein C. Location: Chromosome 1 **Health Implications R506Q** · Elevated levels of thrombin; 7-fold increased risk of clot formation Your Genotype: · Increased chance of heart attack and atherosclerosis · Increased risk of miscarriage, pre-eclampsia, and placental abruption **Treatment Options** · Avoid oral contraceptives; risk of DVT increases 35-fold · Avoid oral HRT, smoking, high homocysteine Platelet activation inhibitors include: fish oils, garlic, onions, ginger, ginkgo biloba, thyme, rosemary, genistein, and aspirin Glycyrrhizin (licorice) inhibits conversion of prothrombin to thrombin · Exercise caution with hypertension



Neither chromosome carries the genetic variation.

One chromosome (of two) carries the genetic variation.

+ + Both chromosomes carry the genetic variation.

(You inherit one chromosome from each parent)



Gene activity increased Gene activity decreased Page 3