

## **Myth vs Reality: New Concepts in Disease Prevention Based on the Human Genome**

The Human Genome Project has debunked the myth of “one-size-fits-all” medicine. A new understanding of how genetic variations influence the risk of many common diseases provides the foundation for more comprehensive and individualized preventive health care strategies.

### **Heart Disease**

**MYTH:** All persons with a family history of heart disease can minimize their cardiovascular risk by reducing their dietary intake of fat and salt, exercising more, and taking a cholesterol-lowering medication.

**REALITY:** Heart disease is not simply a condition caused by excess fat and cholesterol. Research has revealed that there are many other modifiable risk factors, some genetically influenced, that can predispose a person to heart disease.

For example, some people have a genetic inability to properly metabolize folic acid in the body. This can lead to a build-up of homocysteine in the bloodstream, causing increased risk of blood clots and atherosclerosis. Yet none of the “one-size-fits-all” conventional therapies listed above would reduce this risk. For a person with this genetic variation, the only way to reduce risk is to take the active form of folic acid, which is not found in common vitamin supplements.

High blood pressure is typically treated by restricting an individual’s salt intake. However, not all people have the genetic variation (a single nucleotide polymorphism, or SNP—pronounced “snip”) that allows them to respond effectively to a salt-restricted diet. Based on their genetic make-up, they may respond better to aerobic exercise. By testing genetic variations, the physician can better identify which therapy is likely to be the most effective for lowering blood pressure in each patient.

Apo E is a protein in the body that affects cholesterol levels. There are three major genetic variations of the Apo E gene that can affect how each person’s body breaks down fat and cholesterol in the diet. These three variations can lead to an increased, average, or decreased risk of heart disease. By knowing an individual’s Apo E genetic variation, the physician can prescribe the dietary and lifestyle changes, nutritional supplements, or prescription medications most likely to lower cholesterol levels effectively.

### **Osteoporosis**

**MYTH:** All post-menopausal women can avoid osteoporosis by taking more calcium, exercising regularly and taking a hormone supplement.

**REALITY:** Contrary to popular belief, the progressive thinning and weakening of bones as we age is not caused only by a hormone or calcium deficiency. Like many diseases that develop later in life, osteoporosis is multifactorial—meaning it’s caused by many different factors acting together.

For example, some people have a genetic variation that affects how their body makes use of Vitamin D, an important nutrient for bone health. These people will need more than extra

calcium to reduce their risk of osteoporosis. Based on their genetic makeup, they may require additional Vitamin D to strengthen their bones.

Inflammation can accelerate bone loss and increase the risk of osteoporosis. For people with a genetic variation that makes them more sensitive to inflammation, high-intensity exercise could actually contribute to more rapid bone loss – the opposite of what people normally think. These people may reduce bone loss more effectively by adopting a mild, rather than a rigorous, exercise program. In some cases, anti-inflammatory therapy may also help.

### **Asthma/Allergy**

**MYTH:** Asthma and allergies are caused by pollen, dust and pet dander.

**REALITY:** Almost everyone is exposed to environmental irritants such as pollen, dust, and pet dander. Yet only some people develop asthma and allergies. Often, these “vulnerable” individuals have alterations in their genes that make them more susceptible to asthma or allergies. These genetic variations can cause their immune systems to “overreact” to the same pollen that others don’t react to at all.

Understanding a patient’s genetic make-up can help a physician to tailor interventions to “normalize” immune response and prevent allergic reactions. This can help better identify which prescription medications or nutritional interventions (such as Vitamin C, fish oils, and antioxidant-rich foods) are likely to be the most effective for each person.

### **Side Effects of Prescription Drugs**

**MYTH:** Prescription medications used to treat common medical conditions have the same effect on all individuals with that condition.

**REALITY:** Each person’s body processes medications differently. Much of this difference lies in genetic variations that affect a person’s ability to metabolize drugs.

While one prescription medication may be a “good match” for people with a certain genetic makeup, this same medication may not be processed or eliminated efficiently by other people with a different genetic background. As a result, the medication may cause a toxic overdose in the bloodstream, one that triggers negative— or even life-threatening—side effects.

Genovations testing evaluates genetic variations that affect how a person’s body “detoxifies” prescription medications and other drugs. Knowing this information allows doctors to better determine which medications are likely to be the safest and most effective for each patient, and which should be avoided.