

Predictive Genomic Testing; The Future Has Arrived!

In December 2001, the British Medical Journal (BMJ 2001 Dec;323:1409-12) published an article entitled “Genetics and Cardiovascular Risk”. It states the following: “*In the next 10-30 years, a new battery of investigations is likely to improve diagnostic precision and inform prognosis*”.⁽¹⁾

You will be happy to know that you do not have to wait for the next 10 to 30 years to have access to this incredible scientific break through known as *Predictive Genomic Testing*. The future has arrived! You may now, today determine whether you, specifically, are at risk of cardiovascular disease, osteoporosis, cancer, inflammatory disease and other conditions, by simple swishing some Scope mouthwash, spitting it in a test tube and sending it off to the lab. It’s that simple.

Predictive genetic testing has become available to allow us to assess true biochemical individuality. Now, for the first in history we can predict with increasing precision who is more likely to develop specific diseases, who will respond positively to a particular drug or supplement therapy, or react negatively, and finally, which nutrients are optimal for a specific individual’s treatment, health, and well-being.

“Genetics is the scientific study of heredity, one gene at a time. Genomics is the study of genomes, or the totality of the DNA of a single species. Genomics attempts to look at the totality of all our genes as a dynamic system, interacting with and influencing our biochemical pathways and physiology. The Human Genome Project is the mapping and sequencing of the entire human genome.”⁽²⁾

DNA is the blue print, the operational manual for all living creatures. It consists of approximately 3 billion nucleotides. In order to imagine how many and how complex our DNA is: “if all the DNA of a single cell were unraveled into a straight line, it would be approximately 6 feet long. If all the DNA in all your cells were unraveled into a straight line, it would reach to the sun and back a thousand times.”⁽³⁾ DNA regulates gene expression, allowing for cell growth, cell differentiation, cell replication and cell death. DNA uses digital information coded into four letters: A,T,C, and G,. It’s double strands of sugar-phosphate polymers split apart to make two perfect copies of itself. It then transcribes its stored information to a single strand, RNA in order to translate that information into proteins. The rest becomes you. But here is the catch; each cell equals the totality of 800 unabridged dictionaries of information. One misspelling could change the whole picture.

The unique features of an individual are largely because of variations in the genetic code, known as “polymorphisms”. Polymorphisms are not rare – up to 50% of the population may have a specific genetic variations. In each genome we find what is called SNPSs, (pronounced snips) which stands for singular nucleotide polymorphism. Through *Predictive Genomic Testing* we can recognize these SNPs, which can allow us to identify those people who are more susceptible to developing chronic disease like cancer, cardiovascular disease, rheumatoid arthritis, osteoporosis, or chronic inflammation. But

not all of these variations are “bad” some make us more resistant to specific diseases. It is important to realize that these polymorphisms are modifiable through diet, lifestyle and specific medical intervention. In August of 2000, the Centers for Disease Control published

“*The Gene – Environment Interaction Fact Sheet*”.⁽⁴⁾ In it is stated the following:

- Virtually all human disease result from the interaction of genetic susceptibility and modifiable environmental factors.
- Variations in genetic makeup are associated with almost all disease.
- Genetic variations do not cause disease but rather influence a person’s susceptibility to environmental factors
- Genetic information can be used to target interventions.

Predictive genomic testing puts a completely new light on the practice of preventative medicine. As our understanding of genetic variations increases so should our knowledge of environmental factors, thus, the intervention of such knowledge can be used to apply appropriate strategies for high-risk individuals. With these two factors we may now ultimately hold the key to individualized medicine.

Now days, when most people hear the word “genetic” it immediately brings to mind Dolly the sheep or the controversial genetically engineered foods. It is very important to realize that predictive genomic testing has nothing to do with genetic alteration. It also has nothing to do with diagnosing specific, rare, genetic disorders such as Huntingtons or Tay Sach disease, which represent the deficiency of a single gene product and for the most part the outcome, cannot be avoided. The common misconception of genetic testing is that it foretells our fate. While that may be true of certain Mendelian traits, such as eye color or blood type it certainly is not true of most predictive genomic testing. Rather, knowing about increased risk is the first step towards a committed and effective prevention strategy.

In the “*Physician’s Primer of Clinical Genomics Monograph*” ⁽⁵⁾ it states the following:

Finding the polymorphisms that make a real difference in our physiology is the first task of predictive genomics. To be of clinical utility, the polymorphisms identified in predictive genomic testing must meet four criteria: They must be,

1. **Relevant** – the only polymorphisms in the genome of interest are those that exert a significant effect on our biochemistry and physiology

2. **Prevalent** – given our current knowledge of the human genome,

only polymorphisms that exist in a significant percentage of the population are likely to be identified in a cost-effective manner

3. **Modifiable** – only polymorphisms whose effects are modifiable via clinical intervention (diet, lifestyle, supplements, pharmaceuticals, and toxin exposure reduction) are clinically useful.

4. **Measurable** – our genes do not change but our functional physiology and metabolic reserve do change. The progress of our clinical interventions for risk reduction and functional improvement must be measurable. Functional laboratory testing is the primary vehicle by which these changes may be measured.

Over 5% of colon, breast, ovary and prostate cancers are estimated to be due exclusively to mutant genes. Carriers can have a 60-80% chance of developing the disease. But by the same token, 20-40% of carriers of particular mutations will NOT develop disease. Why? Because, in large part, diet, nutrition, and lifestyle factors can exert an enormous influence on how, or even if, a gene will express itself.

The goal of predictive genomic testing is to reveal underlying genetic susceptibility to a wide variety of clinical conditions and diseases. Every person wanting to take a proactive role in his or her health would benefit from an understanding of his or her genetic susceptibility and risk. For a few groups of patients, however, the benefits of predictive genomic testing may be especially great:

- Patients with a family history of chronic disease like heart disease, osteoporosis, cancer, allergy, or chronic inflammation, or patients who may have been adopted.
- Patients with chronic conditions that have been refractory to standard treatment.
- Patients with a history of prolonged toxic exposure.

For the first time in human history we can definitively predict the potential outcome of our future health and do something about it before it leads to disease. For further information on how you may get predictive genomic testing contact the Center for Natural Health.