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The Promise Of DNA Testing For The Masses

By Arnold Stockard

In October 2005, I.B.M announced that genetic information would not be used in hiring or to make decisions for health care benefits. The statement was made as DNA testing appeared likely to become an important business, with numerous start-up firms seeking to establish themselves in the consumer market. Indeed, I.B.M. itself is heavily involved in genetics information research, but when it comes to the potential of DNA testing, one word might describe the future: Google.

The founders of the search engine giant have met with Craig Venter, whose company and the competing U.S. National Institutes of Health discovered the 30,000 genes in the human genome in 2000, in essence, opening a new era of science that will impact a broad swath of enterprise. In Venter's vision, "Genetic information is going to be the leading edge of information that is going to change the world." The home might very well be at the center of such change.

What if you could go to your computer and search for information that relates to your individual genetic make-up. Combined with the results of home-based DNA testing, the information would allow you to determine the questions you should ask your doctor about nutritional and pharmacological interventions.

That day might not be far off. Companies with deep market penetration, such as Nestle and Kraft, are watching the start-up companies, and their entry would make DNA testing technology a widely accessible consumer item. Join readily available tests with Google's always-on presence and what do you get? As Venter states in *The Google Story*, a book by Washington Post science writer David Wise and Mark Malseed: "People will be able to log onto a Google site using search capabilities and have the ability to understand things about themselves as they change in real time. What does it mean to have this variation in a gene?"

Ultimate system

This could be the ultimate health care system. The potential savings in health care costs from individual changes in lifestyle and diet are touted daily. Such changes applied across a population would have dramatic consequences. Currently, DNA testing is still in its technological infancy and

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much too expensive to be a practical tool for the masses, and ethical questions present a host of obstacles. However, the demand created by an educated populace is certain to solve these problems.

First of all, the evidence of gene–nutrient interactions in many diseases and disorders is well–documented and continues to mount. A 2004 study at the Karl–Franzes University Hospital in Graz, Austria, finds that a polymorphism, or genetic variation, is associated with milk intolerance, reduced milk calcium intake and reduced bone mass density at the hip and spine. DNA testing, the study concludes, may be used to detect individuals at risk for bone fractures and osteoporosis.

A study at the University of Michigan, entitled "Strategies for Prevention of Colorectal Cancer: Pharmaceutical and nutritional Interventions," says that a change in diet or supplementation may be ideal for individuals at risk for colorectal cancer. In both studies, the key word is individual. Personal changes in diet and supplementation without knowledge of genetic make–up are a shotgun approach - mega dosing in the hope of hitting any target. Replace this hit–and–miss approach with a rational

regime and the possibilities for health care are striking. One company that offers DNA testing says it reviews the customer's variation in 19 genes that are involved in the body's heart and bone health, detoxification and antioxidant capacity, insulin sensitivity and tissue repair. It combines the results with lifestyle information to recommend steps to improve health.

Obesity

Many people see DNA testing as a way to improve the well–being of large segments of the world inexpensively, compared with the social and economic costs of disease. Considering the world's overburdened health care delivery system, DNA testing does look appealing as a way to intervene early in many diseases, cutting treatment costs. For example, an estimated 300 million people are obese. The costs in early death and related ailments are enormous. A study by the Robert Wood Johnson Health and Society Scholars Program, Philadelphia, Pennsylvania, finds that test subjects modified their behavior positively when they were categorized as having increased genetic susceptibility for obesity.

While nutrigenomics is still an infant science, with much to be learned about diseases caused by multiple genes, what has been learned points toward a revolution in health maintenance. The results of a study published in the November 17, 2005, issue of *New Scientist* offers evidence that, as the article's headline says, "the food you eat may change your genes for life." In the study, conducted at McGill University in Montreal, researchers injected L–methionine, a common amino acid, into the brains of rats. The result was a negative change in the rats' behavior. Observing that a chemical called TSA can have the opposite effect, improving the behavior of rats, Moshe Szyf, one of the McGill researchers said, "Food has a dramatic effect, but it can go both ways."

DNA testing has raised controversy in the U.K., where the preimplantation genetic diagnosis of embryos has been the focus of a government public opinion survey. In a report last autumn in *BMJ*, Suzi Leather, chairwoman of the Human Fertilization and Embryology Authority, says the survey is an attempt to start to build a consensus on the issue. As is increasingly the case in medicine, the U.K. faces a situation in which technology has raced ahead of social values.

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Scientific developments make it possible to test embryos for so-called low penetrance genes, or those in which not everyone who inherits the gene will develop the associated disease. These conditions include inherited breast cancer, inherited ovarian cancer and hereditary non-polyposis colon cancer. The question is whether it is appropriate to test for these conditions - which may or may not develop - so that the condition can no longer be passed on. Another facet of the U.K. survey seeks opinion on whether it is right to test for a gene if the associated disease does not occur until later in life or if the disease can be treated.

Accuracy

On the one hand it can be envisioned that with the continued advances in technology and an implementation of blanket embryo screening over the course of many generations, a society free of hereditary afflictions might be attained. But the ethical dilemma of destroying millions of embryos is an incorrigible obstacle, at least for now. And questions remain: about the accuracy of such tests, whether the tests are more reliable than other available predictive measures and the incomplete knowledge of the causal roles of genes versus the environment. As stated in a January 8, 2004, online article "Genetic Testing for Cardiovascular Disease Susceptibility" in the journal *Arteriosclerosis, Thrombosis, and Vascular Biology*, "for a DNA test to be useful in clinical management of CVD, it is obviously critical

that the tests must have additional predictive power over and above those accepted risk factors that can be easily measured, usually inexpensively, and with high reproducibility and replicability."

As is always the case acceptance of an idea that challenges the entrenched way of doing things is slow in coming. The DNA tests now being offered may help perfect the technology and advance dialogue that helps answer the ethical questions.

When it comes to the use of DNA testing to improve health, such as tailoring diets to the predisposition for a disease, much that is unknown. The promise is that one day you may be able to eat your way to health, depending on your genetic code. But getting there means traveling a complex road with unknown twist and turns - and we definitely are not there yet. But are we moving in the right direction?

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Arnold Stockard is a science writer and editor. To learn more about getting a DNA test today,

<http://tinyurl.com/nmkx3>

Paternity Testing: To Be The Father Or Not To Be....

By Martin Myers

Before you can understand the importance of paternity testing, you must first understand the DNA element involved and why DNA is used to establish paternity. DNA is the pattern for your genetic makeup. Each and every person has a different pattern of DNA. However, persons belonging to certain

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ethnic backgrounds, certain races, or simply certain features, can have DNA that shows related characteristics. No two people, except for identical twins will have the same DNA.

Every person has 46 chromosomes in each cell. The only exceptions are the sperm and egg cells. They each have 23. At the moment of conception, however, the 23 chromosome from the sperm and egg combine to form 46, and at that moment, you have the chromosomes needed to create a new person. This pattern for your genetic makeup is a combination of maternal DNA and paternal DNA. In other words, half your makeup is your mother's and half is your father's. Now, since the mother would be the person giving birth, there is no dispute about maternal proof. She was there at birth. But what about paternal proof? How do you determine the identity of the father, without a shred of doubt?

Enter DNA paternity testing. DNA testing works in the following way. The DNA of the child is tested. A test strip of DNA "bands" is established. The DNA is then tested from the alleged father. If the child and the man share common "bands" in a number of different locations, then paternity is established with 99.9 percent accuracy. That is as accurate as the results can be. This is a seemingly simple test, to have such a staggering effect on the people's lives that are involved. Entire families have been ripped apart over paternity issues. Lives have been forever changed, thanks to one little DNA test.

Today, paternity testing is utilized to decide custody cases, establish legitimate child support cases, influence adoption proceedings, and to aid in claiming inheritance by providing proof of relationship. By far, however, the largest use of DNA testing is in determining paternity issues. Most courts accept 99.9 percent positive as equal to a result of 100%.

There are tests available that can be used at home, but in the case of a legal battle, or establishing legal paternity, only the tests conducted by certified and licensed facilities will be allowed.

Martin Myers provides medical related information on his blog at:

<http://www.paternity.4-your-health-only.com>



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