

THE WALL STREET JOURNAL.

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Test Your Genes to Find Your Best Diet

Nutritional genetic testing can reveal what nutrients you're missing and if you're drinking too much coffee

By **SUMATHI REDDY**

Aug. 22, 2016 1:36 p.m. ET

Your genes can help tell you what to eat and influence how diet affects your health.

Variants in some of our genes determine how we metabolize and utilize nutrients, a field of study known as nutrigenomics. Nutritional genetic testing is offered by a handful of companies and clinics, though it is currently expensive and generally not covered by insurance, limiting its usage.

People who have an impaired ability to metabolize iron, for instance, might have an iron deficiency, even if they eat the same diet as others who process the mineral more efficiently. Similarly, some people don't adequately absorb calcium, and they might benefit from a bone-density test and specialized nutritional advice.

Gene variants also can help explain why people choose the foods they do—a greater propensity for sweets or salt, for instance. And the tests also can show how our bodies respond to different types of exercise.

Genetic testing has gained widespread use in other areas, especially in helping to determine our risk for developing various diseases, from cancer to cardiovascular conditions. Another, more recent use for genetic testing is known as pharmacogenomics, which can help doctors predict which of various medications are most likely to benefit individual patients.



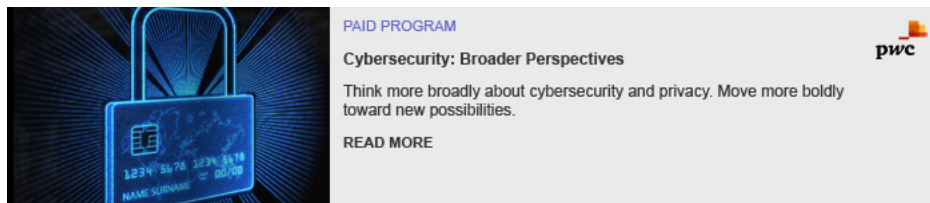
CAFFEINE: People with certain variants on gene CYP1A2 are slow metabolizers of coffee, putting them at greater risk for high blood pressure or a heart attack when caffeine intake is high. 1 in 2 people is at risk. **SPINACH:** Deficiency in folate, found in greens, is linked to greater risk of heart disease and stroke. It can result from variants on gene MTHFR that slow the conversion of dietary folate into an active form of the nutrient. 2 in 3 people are at risk. *PHOTO: GETTY IMAGES (2)*

Some experts say genetic science is too young to be able to provide nutritional advice. “We still have a long way to go in the development of practical tools,” says José M. Ordovás, director of nutrition and genomics at the Jean Mayer USDA Human Nutrition Research Center on Aging at Tufts University and a leading researcher in nutrigenomics.

Dr. Ordovás says most nutritional genetic tests look at just a handful of genes, which isn’t enough to guide dietary decisions. His own research is aimed at evaluating the entire human genome, which consists of 20,000 to 25,000 genes.

The Academy of Nutrition and Dietetics—a professional organization of nutrition professionals—published a position statement in 2014 in the group’s journal saying it was too early to use nutritional genomics to manage chronic disease or provide dietary advice.

Nutrigenomix Inc., started by scientists at the University of Toronto, offers a test of seven genes, which provides insight into some basic nutritional properties, and another, more comprehensive test of 45 genes. The tests are offered through various clinical partners, including the Wellness Institute at the Cleveland Clinic. Dietitians and others buy the 45-gene test from the company for \$300 and usually charge another \$100 to \$200 for a follow-up consultation.



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“We’re talking about nutrition advice. We’re not talking about predicting disease,” says Ahmed El-Sohemy, chief scientific officer of Nutrigenomix. “This is about healthy eating and how you metabolize.”

The company only provides testing, which can be ordered online, if done through a health professional, says Dr. El-Sohemy, who is also a professor and research chair in nutrigenomics at the University of Toronto. For people who already eat a healthy diet, nutritional genetic testing might not be that useful, he says.



SALT: Gene ACE produces an enzyme to help regulate the body’s response to sodium intake. People with certain variants are at greater risk for high blood pressure when eating lots of salt. 7 in 10 people are at risk. **SUGAR:** Gene GLUT2 helps regulate glucose, or sugar. People with certain variants prefer sweet foods and drinks, putting them at greater risk for being overweight and developing cardiometabolic disease. 1 in 5 people is at risk. *PHOTO: FROM LEFT: GETTY IMAGES; ISTOCK*

Other companies that offer similar tests are 23andMe, Interleukin Genetics and Vitagene, among others. Some companies such as DNAFit also focus on genes related to exercise.

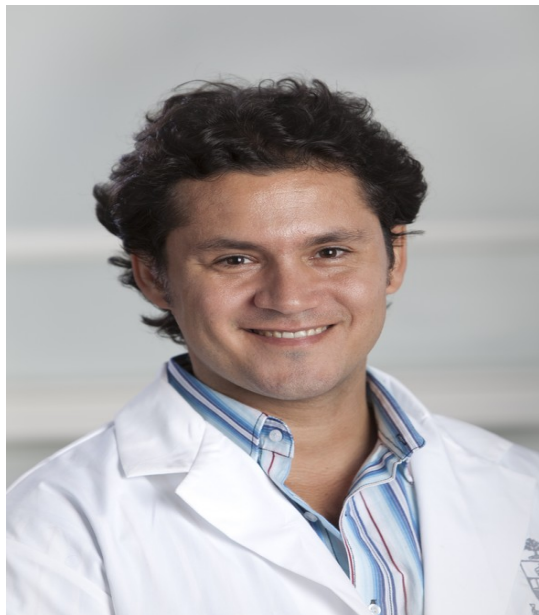
Mary Pipino ordered tests by Nutrigenomix through her nutritionist at the Cleveland Clinic's Wellness Institute. Ms. Pipino, chief executive of an insurance-risk management firm, says she eats a healthy diet and is an avid exerciser and a certified group and personal trainer. She got the seven-gene test initially and recently also did the 45-gene test.

Ms. Pipino's nutritionist helped her interpret the results. She says she learned her body doesn't digest dairy or absorb iron well, and that she's a slow metabolizer of caffeine. She also learned she is genetically predisposed to strength and endurance training, which she gravitates to anyway.

The 58-year-old says she eliminated yogurt from her diet, which made her feel less bloated. She also changed some of the vitamin supplements she takes, adding more iron but reducing B-12, which she absorbs adequately from her food.

"It's much easier to put together your personal lifestyle plan after you have this information because it gives you the blueprint of your body," she says.

"I don't think it leads to a change in behavior in every single aspect of your diet," says Kristin Kirkpatrick, manager of wellness nutrition services at the Wellness Institute, and Ms. Pipino's nutritionist. "But it definitely changes behavior in more specific areas."



Dr. Ahmed El-Soheemy, research chair in nutrigenomics at the University of Toronto, is also chief scientific officer of Nutrigenomix Inc., which offers nutritional genetic testing through various clinical partners. 'This is about healthy eating and how you metabolize,' he says. PHOTO: JAMES BRYLOWSKI

Genetic testing can also reveal, for example, how quickly people metabolize caffeine by examining a gene known as CYP1A2. Heavy coffee drinkers who are slow caffeine metabolizers retain more of the stimulant in the body, putting them at increased risk of having a heart attack and developing diabetes and hypertension, studies have found.

People who metabolize caffeine quickly receive a protective effect from moderate consumption of coffee, some studies have found. One theory is that because those people eliminate the bad parts of coffee faster they may be able to benefit from the good ingredients, such as polyphenols.

Another gene, GLUT2, can show how well the body regulates sugar, or glucose. People with certain variants of the gene could have a greater preference for sweet foods and drinks—a sweet tooth—which could put them at increased risk of being overweight.

Nutrition scientists have looked at whether genetic testing ends up improving eating behaviors. The evidence is mixed. A recent large randomized controlled study found there was little apparent benefit.

The six-month study, funded by the European Union, followed 1,269 people in seven countries. Three groups of participants were given personalized dietary advice, with variations based on their regular diet; their phenotype, including blood biomarkers such as cholesterol; and genetic variants. A control group was given conventional dietary advice.

“This was built on the idea that if you personalize advice and support for people they will pay more attention and be more likely to act on that in a sustained way,” says John Mathers, director of the Human Nutrition Research Centre at Newcastle University in England and senior author of the study, which was published in August in the *International Journal of Epidemiology*.

At the end of the study, the three groups that received personalized nutrition advice had all improved their eating habits, compared with the control group. But the improvements in each of the three groups were about the same. “It didn’t seem to matter whether you personalized based on current diet, phenotype or genotype,” Dr. Mathers says.

J. Bruce German, a professor and director of the Foods for Health Institute at the University of California, Davis, believes some people can benefit from nutritional genetic testing.

For example, some genetic variants on the MTHFR gene result in reduced activity of an enzyme that converts dietary folate into an active form of the nutrient. People with these genetic variants could have a folate deficiency, which has been linked to a greater risk for heart disease and stroke.

Dr. German is a slow folate absorber, he says, so he has increased the amount of greens in his diet. “Most people know that they should eat more green matter but they don’t anyway,” he says. “Being told you are genuinely at risk makes green vegetables a more convincing food choice,” says Dr. German, who is on a Nutrigenomix advisory board, a voluntary position.

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