

Feeling Good

GIVE YOURSELF THE GIFT OF GREAT HEALTH



Who Do You Think You Are?

At-home genetic testing can help you understand your biology. But before delving into your DNA, consider the caveats. *By Sarah Elizabeth Richards*

EVER SINCE THE first draft of the human genome was sequenced in 2001, we've heard that examining our DNA data would reveal what makes us tick and what might someday make us sick. Less than 20 years later, for the price of a nice handbag, we're able to use a genetic testing kit to learn more about our past, present, and future than we ever dreamed possible, all from

ILLUSTRATIONS BY Jack Hudson

the privacy of home. In 2017, an average of 14 genetic tests were launched daily, according to the technology company Concert Genetics. A recent *MIT Technology Review* analysis revealed that the number of people who purchased kits more than doubled that year and now exceeds 12 million.

That's a lot of people, with access to a lot of data—"more raw personal biological information than ever before," says Jeffrey Kahn, PhD, director of the Johns Hopkins Berman Institute of Bioethics. "Some of that info can be reassuring, some can be overwhelming, and some is simply interesting. The challenge is knowing how to let it affect you."

If you're interested in becoming better acquainted with yourself, check out this cheat sheet on what you can—and can't—get from a DNA kit.

YOU CAN: Discover where in the world you're from.

For less than \$100 and a vial of your saliva or a swab of your cheek, companies like AncestryDNA, 23andMe, and MyHeritageDNA will reveal your ancestral origins. They do this by comparing your DNA to groups that represent regional populations from several hundred years ago, before modern migration, plus more current country populations.

In the past, the results matched lineage to vast continental swaths, but over the last two years, as companies' databases have expanded and previously unrepresented groups have been included, the tests have been increasingly able to offer more specific geographic information. For example, 23andMe used to tell customers they simply had,

say, sub-Saharan African ancestry; now it can sometimes reveal if they're Sudanese or Nigerian. And AncestryDNA may be able to tell those with Irish roots whether they're from County Kerry or County Cork.

YOU CAN'T: Determine your clan, class, or tribe.

"We aren't able to satisfy the curiosity of Scandinavians who wonder whether they're related to Vikings," says Scott Hadly, a 23andMe spokesperson. And while the tests may tell you that you're part Native American, they can't link you to specific tribes, few of which have shared their DNA for research purposes.

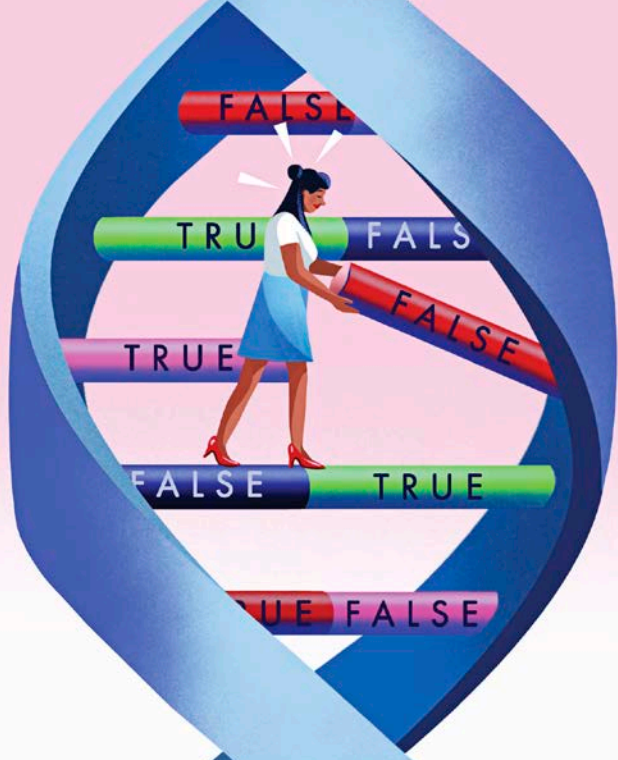
YOU CAN: Find out whether you have certain mutations that increase your risk of cancer.

Last spring 23andMe made headlines after winning FDA approval to expand its \$199 consumer test to detect certain mutations in the BRCA1 and BRCA2 genes that increase the risk of breast, ovarian, and prostate cancer. This test, which can be taken without a doctor's authorization, identifies the three most common mutations in people of European Jewish descent, says Lisa Madlensky, director of the family cancer genetics program at UC San Diego Health.

Color Genomics offers a \$99 test that looks at 30 genes associated with eight hereditary cancers. (The test must be ordered by a physician, but the company can connect you with one for free.) "While everyone has some risk of getting cancer,



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these tests identify people who have a much-higher-than-average risk, who might benefit from more frequent screenings that start at a younger age,” says Madlensky.

YOU CAN'T: Calculate your odds of getting cancer.

Even with a BRCA mutation, your individual risk of getting breast cancer varies according to the kind of mutation you have, your age, and your family and medical history. A positive result still needs to be confirmed in a medical lab, and a negative result doesn't mean you're in the clear: There are thousands of BRCA mutations not identified by these tests. People with a family history of breast cancer should talk with their doctor about more comprehensive testing in consultation with a genetic counselor.

YOU CAN: Stumble across family members you never knew you had.

You may have idly fantasized about having a secret sibling, but you've probably never considered the emotional repercussions of discovering a real-life surprise sister—or parent. Yet when genetic-testing companies compare clients' info, they may turn up relatives who share the same DNA. The result is a brave new world of paternity scandals (*mamma mia!*) and pregnancies that were supposed to



WE ARE FAMILY?

Janel Myers had known since age 11 that her parents conceived her using a sperm donor. What she didn't know: The donor had at least 20 other children. The clue was a message from another AncestryDNA member: “How exciting! It looks like we are half sisters.” (When you take the test, you indicate whether you're open to being connected to people who share your DNA.) Myers was invited to join a private Facebook group and now frequently chimes in on posts. She says, “While I doubt I will ever see them as ‘siblings,’ it's nice to have so many people I can share this unique situation with.”

remain hush-hush. In fact, the private Facebook group DNA NPE Friends (NPE stands for Not Parent Expected) now has more than 3,000 members, many of them shocked genetic-test users. While the news is sometimes welcome, Timothy Caulfield, research director of the University of Alberta's Health Law Institute, advises would-be testers to think about how they'd react to finding out that Dad isn't their biological father, or that they have a mystery big brother.

YOU CAN'T: Likely connect with relatives past your fifth cousins.

On average, you share 0.05 percent of your DNA with your fifth cousins (with whom you also share great-great-great-grandparents). So even if you're sure you're *somehow* related to Rihanna or Tina Fey (family rumor!), it's hard to correctly identify very distant relatives and prove it.

YOU CAN: Help assess your risk for certain cardiovascular conditions.

Geneticists have identified hundreds of DNA markers that influence your risk for developing heart disease, and now there are panels that test for several of these key genes at once. The medical testing lab Invitae offers a doctor-ordered \$250 cardiovascular test that can detect DNA mutations associated with cardiomyopathy, a condition that weakens heart muscles and can lead to heart failure. “If you know you have it, then you could try to avoid heavy exercise and get frequent checkups,” says Robert Nussbaum, MD, Invitae's chief medical officer. The panel also detects genes for arrhythmias, which can cause fatal abnormal heartbeats, and conditions that rupture blood vessels.

One of the most significant advances is increased testing for familial hypercholesterolemia (FH), which can involve dangerously high levels of “bad” (LDL) cholesterol from a young age. “An estimated 90 percent of people are unaware they have this,” says Daniel Rader, MD, who

specializes in cardiovascular genetics at the University of Pennsylvania's Perelman School of Medicine. Yet people with FH have up to 20 times the risk for heart disease, which can lead to heart attacks and stroke.

YOU CAN'T: Discover that you'll have a heart attack by age 50.

“These tests show only the probability of having a heart attack compared with the average person,” says Rader. Still, that info can inspire you to make key lifestyle changes and to consider whether cholesterol-lowering medication is right for you.

YOU CAN: Find out if you're at increased risk for Alzheimer's and Parkinson's.

A number of tests now include the genetic variant APOE e4, which is linked to an increased risk for Alzheimer's. People with one copy—that's 22 percent of the population—have three times the risk of developing the disease by age 85. According to Harvard geneticist Robert C. Green, MD, the 2 percent of people who have two copies are 15 times more likely. As for Parkinson's, a small percentage of cases have a genetic basis; people of Ashkenazi Jewish or North African descent with a particular genetic variant have about a 25 percent increased risk of developing the disease. (Note: 23andMe lets you decide whether you'd rather not know if you have these variants.)

YOU CAN'T: Know for sure that you'll get a life-changing disease.

Experts say genetic variants aren't the sole predictors of risk; the chances and timing of developing Alzheimer's or Parkinson's may be affected by other genes or lifestyle factors such as diet and exercise. At the same time, researchers continually discover new genes, so testing negative for these variants doesn't mean you're free from all risk. Learning about your genetics can be powerful, but they're only one factor in determining your fate—the rest is up to you.