



Fitness Secrets in Your DNA

New genetic-testing kits promise to uncover your ideal workout and nutritional quirks—even whether you're prone to injuries. All they need is a little spit.

by CHRIS SWEENEY



WE ARE LIVING IN the golden age of fitness data. Our phones note every step we take and stairwell we climb. Our GPS watches record our heart rate and per-mile pace over the course of years. There are apps that count calories, macros, and ounces of water consumed with the ruthlessness of an IRS auditor. Tech-enabled mattresses even promise to optimize our bedtimes after learning about our sleep cycles. But pretty soon all that stuff will seem downright retro, thanks to a new wave of DNA tests that have the potential to make our current analytic accessories seem antiquated.

Imagine that, in addition to learning you're

9 percent Scandinavian, you find out you're genetically predisposed to excel in endurance sports rather than sprinting ones, you're prone to soft-tissue injuries, you're highly sensitive to caffeine, and you should eat fewer saturated fats than the guidelines recommend. And all it took was a test tube of spit.

Just 15 years ago, peering so deeply into your DNA was impossible. Then, in 2003, scientists finished sequencing the human genome—a roughly \$4 billion endeavor—and kick-started the genomic revolution. In the years since, the technology has gotten better, faster, and much, much cheaper. Today, for a few hundred bucks, a lab technician will press your saliva onto a slide and scan through hundreds of thousands of base pairs in your DNA, looking for variations that are thought to impact athletic performance and diet. For instance, a variant of a gene called BDNF is believed to diminish a person's natural motivation to exercise. Meanwhile, variants of the gene COL5A1 are believed to be associated with increased risk of Achilles tendon injuries; and a variant of the gene ACTN3 reportedly helps people excel in power sports, such as weightlifting.

Can having all this subcellular data on hand help improve workouts, though? Cross-Fit godfather and physical therapist Kelly Starrett thinks so. "There are genetic markers that really can impact the way I train," he says. The way he sees it, knowing that someone might be at higher risk for a certain type of injury is an easy way to avoid "stepping on the rakes" while training. In other words, if an Olympic rower might be genetically predisposed to tendon injuries, Starrett can build in extra time for warmups and pay close attention to soft tissue during recovery periods.



Does your double helix dictate whether to run 5Ks or marathons?

Starrett isn't a geneticist, however, and not everyone is as optimistic. The growing number of companies offering fitness and nutrition advice based on DNA analysis—there's Orig3n, DNAFit, AnabolicGenes, Athletigen, and EmbodyDNA, to name a few—has set off alarm bells among some critics who blast these services as digital-age snake oil.

"Total malarkey," says Eric Topol, a professor of molecular medicine at the Scripps Research Institute in Jacksonville, Florida. Topol has no problem with the technology that's being used to sequence the DNA, but he's put off by how these companies are interpreting the results and relaying the information to consumers in the form of report cards chock-full of broad-stroke diet and exercise recommendations. "It's never as simple as they are trying to portray it," Topol says.

As for certain genetic variants being linked to things like tendon injuries and athletic motivation, Topol doesn't buy it, contending that most of these associations are based on studies that he now considers archaic. "A lot of these things that are in the old literature have never been replicated in the modern era of genomics," he says.

Others in the medical community aren't as quick to dismiss the tests. "This is real science," says Robert Green, a professor at Harvard Medical School and a geneticist at Brigham and Women's Hospital in Boston. Green, who has consulted for the consumer genetics company Helix, says it's well-established that genetic variants are associated with things like breast cancer and lactose intolerance—and he believes that genes most certainly influence how your body reacts to different types of workouts and foods.

That said, Green's major worry is that com-

panies are overstating how large an effect a genetic variation might have, something with which scientists themselves are still wrestling. "An association can be a very small association," Green says. "It can mean you're 2 percent more likely to digest a particular food element efficiently or 3 percent more likely to have a kind of ligament that predisposes you to sprains or tears."

There's also the fear that people put too much stock in the test results. Analyzing your DNA "is a piece of the puzzle, but it's not a definitive answer," says Scott Weissman, a genetic counselor. At his private practice in Chicago, Weissman's schedule is filling up with more and more people who plunk down the cash for one of these kits, then want additional help deciphering the results. It can be confusing because these analyses look at what scientists call single-nucleotide polymorphisms, or SNPs, tiny fragments of DNA that may be associated with a particular trait but aren't necessarily the cause of the trait.

Further complicating matters is that it's possible to have one SNP associated with a particular trait—trouble digesting starch, for example—and another SNP that indicates the exact opposite. In that case, nobody knows how the SNPs interact. Do they cancel each other out? Does one override the other? "The data is not there," Weissman says.

Given the uncertainty, it's tempting to write off DNA tests as the latest fitness fad. In truth, the field of consumer genomics isn't going anywhere—if anything, it's just getting started. "The products will get better and better until they really do definitively help people with their diet and exercise needs," says Green. "We're only in the first microsecond of the genomic revolution." ■

TRY IT

FIND GENES THAT FIT

Even if the science leaves you skeptical, decoding your DNA is kind of fun. Use the results to help bust through a fitness plateau or bounce back from a rut. You'll only have yourself to thank.

Orig3n

They look at six genes that influence your power performance, eight that relate to endurance, two that tell you about your joints, and more; all for the cost of a couple of personal training sessions. \$149; orig3n.com

FitnessGenes

Pick a goal (lose weight, get lean, get a body like the Rock) and let your DNA (and their diet and exercise plans) show you the way. \$219 to \$439; fitnessgenes.com

DNADFit

In addition to the standard fare (how well you recover from exercise, whether you're gluten-sensitive, etc.), you can also see how your DNA stacks up to that of elite athletes worldwide (and why they're superior to you). \$199 to \$299; dnafit.com