Nutrition In a Pill?

By John Cloud/Salt Lake City

The first question isn't why but why not? Vitamins, probiotics, omega-3 capsules, antioxidant pills: they can't hurt, right? Around the corner of each advancing birthday lurks a possible affliction — arthritis, cancer, Alzheimer's — and a giant industry has emerged to try to prevent them all. Americans now spend an estimated $28 billion a year on dietary supplements — more than twice what we spent in 1995 and more than $5 billion more than what we pay each year for gym memberships. But do supplements actually work?

Dietary supplements occupy the broad, poorly regulated space between two more-defined kinds of consumables: foods and drugs. Because they can and sometimes do provide both nutrition without eating and wellness without medicine, supplements have acquired a new name in recent years: nutraceuticals.

When I turned 40 last year, I decided to subject myself to a nutraceutical regimen. For five months, I took 22 pills a day. There were also protein bars, powder drinks and enough psyllium fiber to regulate an elephant — but before I took anything, I got a blood test. In January, a lab measured the baseline levels of calcium, protein, sodium, cholesterol and other substances in my blood. After five months and more than 3,000 pills, I had another blood test to see what, if anything, had changed.

I didn't randomly pick the pills I took. A new, highly lucrative trend in the nutraceutical business is a personalized approach. You provide the supplement company with details of your eating habits and medical history, and it sells you a customized suite of products. (No supplement company I found actually looks at blood results in advance.) If you don't eat much fish, you'll get an omega-3 pill. If you have trouble sleeping, melatonin is on the way.

Whether nutraceuticals improve health — and how — is a matter of enormous scientific inquiry. New studies emerge regularly. Take one recent week: on June 27, the Journal of Clinical Oncology published...
the results of a Stanford study showing that a tablet with calcium and vitamin D may lower your chances of getting skin cancer. That same day, the Public Library of Science (PLOS) reported that a compound called fisetin, which is found in strawberries, reduces the severity of complications from diabetes. On June 30, a team of 18 researchers from France and the U.S. announced that a daily dose of resveratrol — a substance found in grapes that winemakers love to tout — may help prevent loss of bone-mineral density.

And yet all three studies turned out to have shortcomings common to nutraceutical research. The Stanford paper was based on just 176 women chosen because they had a history of a specific type of skin cancer. The PLOS study as well as the France-U.S. one looked only at rodents. When I met with Dr. Glenn Braunstein, chairman of the department of medicine at Cedars-Sinai Medical Center in Los Angeles and an expert on nutraceuticals, he was frank about the state of the research in general. Overall, he said, "the data is lousy." Many nutraceutical studies have tiny sample sizes and lack placebo controls. Braunstein added that because some supplements have 10 or more ingredients, it's difficult to determine which ingredient is doing what.

(See why acting your age is a thing of the past.)

So I was surprised when Braunstein revealed that he takes a nutraceutical product, a tablet containing 2,000 international units of vitamin D. What about all that stuff about poor sample sizes and placebo controls? He said a growing body of high-quality literature is showing that even those who live in sunny climates can have low vitamin-D levels. (When exposed to sun, the body naturally produces vitamin D.) He also said that even though he is an avid runner, he discovered not long ago that his blood contained 26 nanograms per milliliter (ng/ml) of vitamin D, below the 30 ng/ml level that many doctors see as a healthy baseline. After he started taking the supplement, his score shot into the high 30s. My vitamin-D measure also skyrocketed when I took nutraceuticals: I went from 28 ng/ml in January to 49 ng/ml in June.

So it turns out that some nutraceuticals work, at least enough for a skeptical medical-department chairman to take a daily just-in-case dose. Braunstein said there's debate in the medical community over whether 30 ng/ml is really the right benchmark for vitamin D, but all the questions led me back to the original one. Why not take supplements just to be safe? Admittedly, that's more a question of faith than of science, a question that recalls a classic discussion about religion: If you go to services every week but it turns out there's no God, no harm done. But if you choose a reckless path, you burn for eternity. So just swallow the pill, right?

See TIME's special: How to Live for 100 Years.

Health by the Carton

The boxes arrived just before my first blood test. The cardboard was crisp; the tape, perfectly cornered. But it was like a disappointing Christmas. Each box contained pills and powders and fake-food bars. There
were so many that I had to start stacking them under the bed.

A few weeks earlier, I had completed an online evaluation for Usana Health Sciences, a Salt Lake City — based supplement maker with a reputation for high-quality products. According to Standard & Poor’s, the company earned $565 million in revenue over the previous 12 months, which actually makes it one of the smaller players in the nutraceutical world. By comparison, GNC, a brand you may recognize from the mall, reports revenue of $1.93 billion. The world’s largest pharmaceutical company, Pfizer, which earns most of its $68 billion in annual revenue from drugs, sold an estimated $463 million in supplements (like its Centrum vitamin) last year in the U.S., according to the Nutrition Business Journal.

The nutraceutical market is growing so fast among aging boomers that even giant food and drug companies are stumbling as they attempt to maintain their positions. Last year the Dannon Co., which makes Activia yogurt, settled allegations brought by 39 state attorneys general who objected to Activia ads suggesting the yogurt could prevent irregularity. A few weeks earlier, the drug company Bayer agreed to pay $3.3 million to three states after their attorneys general accused the company of claiming, wrongly, that one of its newer One a Day vitamin products reduces the risk of prostate cancer.

(See photos of what makes you eat more food.)

On the health form I completed for Usana, I reported my dietary habits (a combination of farmers'-market rectitude and late-night Rice Krispies Treats vice), sun exposure (less than 10 minutes a day), exercise routine (vigorous to the point of obsessive) and alcohol intake (enthusiastic). After I submitted the form, software at Usana crunched the data and kicked out a list of supplements I would need: eight pills in the morning and another eight at night, along with six other pills throughout the day. My a.m. HealthPak consisted of two Procosa IIs, two Mega Antioxidants, two Chelated Minerals, one CoQuinone 100 and one Proflavinol C 200.

One of the first things you learn about nutraceuticals is that the names are mostly made up. Procosa II is what Usana chose for a tablet that contains vitamin C bound with manganese and the chemical glucosamine sulfate, a naturally occurring compound found in the fluid around the joints that you can take as a supplement for arthritis. Usana’s Mega Antioxidant pill contains vitamins A, B6, B12, C, D3, E and K, along with 19 other ingredients.

What exactly are all these substances? I discovered that no government agency catalogs (let alone tests) dietary supplements. Under a 1994 law, the federal government defines dietary supplements as any vitamin, mineral or herb (along with a few other more obscure substances) that is intended to be swallowed in order to augment diet. The U.S. Food and Drug Administration lacks the authority to approve prospective supplements for safety or effectiveness, and the agency can’t act to restrict even a reputedly risky product until it hits the market. Since 1994 the FDA has banned only one dietary supplement — the dangerous weight-loss alkaloid ephedrine — and some industry critics say the agency needs more power.
But safety isn't the real problem with nutraceuticals, most of which are harmless. Instead, effectiveness is the issue: many supplements may not do enough to be worth the money. 

*(See TIME's special report, "The Science of Appetite.")*

The Makings of a Guru

The decision about whether to take nutraceuticals is complicated by the fact that the lines among the three categories — food, drug and supplement — have always been scientifically blurry and politically contested. Ninety-nine years ago, a Polish-born chemist named Casimir Funk coined the term *vitamine* in a paper about his work with a substance in the inner bran layer of rice that Funk labeled in an experiment as "B1." And so B1 became the first named vitamin. Without B1, later dubbed thiamine, humans develop a disease called beriberi, for which B1 pills can be a treatment. But is B1 a food (a part of rice), a drug (a cure for beriberi) or a supplement (an additive you take just in case)?

In the years after Funk's discovery, an industry was born. Even before World War II, doctors began recommending cod-liver oil because it could provide the newly discovered vitamins A and D. During the war, the military sent millions of dollars' worth of vitamin tablets to service members around the globe, and food companies bought vitamin powders to use as enrichments for not only bread but even beer and jelly. These "fortified" products were, in some ways, the first nutraceuticals.

*See TIME’s health special on cancer.*

Then, in the 1960s, the biochemist Linus Pauling began advocating huge, controversial doses of vitamin C to prevent the common cold. Pauling — who had won two Nobel Prizes, one in 1954 for his chemistry research and one in 1962 for his antinuclear activism — had completed little rigorous research on the vitamin, but he had the makings of a guru. He was credentialed and yet elfin, sympathetic and yet persistent. Sales of vitamin-C pills exploded after his blockbuster book *Vitamin C and the Common Cold* appeared in 1970.

Pauling, who died in 1994 of prostate cancer at age 93, left a scientific legacy beyond his vitamin-C crusade: the Linus Pauling Institute at Oregon State University, which provides a steady stream of peer-reviewed research into whether and how nutraceuticals work. The institute also produces many of the young nutritional scientists who go to work for the research departments of nutraceutical companies. When I visited Usana's Salt Lake City headquarters in July, it was a former Pauling student, a molecular biologist named Brian Dixon, who met with me to review my lab results.

Dixon is 35, compact and extremely polite. He wore jeans to our meeting, and he was unguarded as he gave me a tour of Usana's labs and warehouses. Usana manufactures 90% of its products at the Salt Lake
City headquarters, which produces more than 22 million tablets each week. Like several other big supplement companies, Usana sells its products, Avon-style, through networks of more than 200,000 independent distributors — husband-and-wife teams working from home, personal trainers looking for side money, unemployed people hoping for better. On my tour, I saw Usana's Wall of Fame, which is actually several walls along several hallways that display glossy head shots of the biggest vendors.

(See the government's new guidelines for Vitamin D and Calcium.)

Dixon and I reviewed copies of my two lab reports, including the baseline results from January and the postregimen results from June. Each report showed 31 measurements, the first of which was "glucose, serum," a measure of my blood sugar: 83 milligram per deciliter (mg/dl) in January and 88 mg/dl in June, a change neither statistically nor medically significant. In fact, even after more than 3,000 pills and a daily diet of fiber powders and protein bars, little had changed. Two measures of my kidney health (values for blood-urea nitrogen and creatinine) were identical. Calcium, protein, sodium — none had varied much.

I asked two doctors to review my lab results: Braunstein at Cedars-Sinai and Stephen Dillon, my personal physician of 15 years. Both said only two of the values on my blood report had changed significantly. First, there was that 75% vitamin-D increase, which the two of them attributed to the vitamin-D3 supplement I had been taking (rather than to my spending more time outside). Second, my level of high-density lipoprotein (HDL) cholesterol — the good one — had leaped from 61 mg/dl in January to 89 mg/dl in June, an increase of 46%. Braunstein said he couldn't explain such a big surge. He pointed out that supplements that include niacin can amplify HDL cholesterol, but he suspected that my niacin dose of 40 mg per day was too low to account for such a large increase. Dillon speculated that the 2,000 mg of fish-oil concentrate I had been taking may have played a role.

(See how to figure out food labels.)

I was frustrated by the lack of firm answers. When I asked Dixon what he thought about my HDL, he was careful. The FDA prohibits supplement companies from making unsupported health claims. "We make no representations that nutritional supplementation is a quick fix," he told me. "We just consider these nutritional supplements to be almost an insurance policy."

But health insurance of any kind isn't cheap. Usana billed Time more than $1,200 for the five-month supply of nutraceuticals I took. Braunstein said that for far less, Dillon could have done a simple blood test that would have shown my slightly-lower-than-normal vitamin-D level. I could have then started buying over-the-counter, generic vitamin-D tablets — and had money left over for a new gym membership.

O.K., but the supplements had also made me feel different — healthier, more robust. My blood hadn't changed, but a strong placebo response had occurred. I woke up every morning feeling vigorous in a way I hadn't in years. And that turned out to be a problem.
The Licensing Effect
One morning in March, a couple of months into my nutraceutical regimen, I noticed that my jeans were tight. A week later, I went up a notch on my belt. Usana had asked me to keep a health log, and now I looked back. I was 170 lb. (77.1 kg) on Feb. 1, 175 lb. (79.4 kg) by late February and 180 lb. (81.6 kg) on March 30.

I had also been recording my meals. I was eating fine in early February. On Feb. 6, for instance, I had grilled chicken, vegetables and brown rice for dinner, along with pineapple juice. But the following month, there were entries like this one, for March 2: "Burger, a few fries and onion rings." That came after an afternoon chocolate croissant.

Psychologists have a name for my behavior: the licensing effect. (Nutritionists have called it compensation.) The nutraceuticals had made me feel virtuous. Vitamin C? Niacin? Vitamin K? I had plenty. Any nutrient that my body could possibly need would be provided by these pills and powders. So I changed my routine. Other people may have to eat sautéed kale, but I get fries. (An Aug. 2 study published in the journal Addiction shows that the same thing happened with smokers: those who took pills they believed were vitamins — the pills were actually just sugar — smoked significantly more cigarettes afterward than those in a control group.)

(See photos from farm to fork.)

It took me three months to lose the weight. In the end, Dixon helped me do it. He emphasized that his company's products should be taken only in concert with a nutritious diet and plenty of exercise, water and sleep. He also sent a cookbook, Low-Glycemic Meals in Minutes; the meals were better than they sound.

Dixon was always a meticulous scientist, but then I thought about how most Usana products are sold, through networks of nonexperts, all those homemakers trying to get on the Wall of Fame. Would they be as scrupulous about recommending Usana products only as an adjunct to a healthy diet?

Some doctors worry that nutraceutical enthusiasts will come to believe that if a little vitamin help is good, more will be better. Vitamin overdose is rare, although Dr. Eduardo Marbán, director of the Cedars-Sinai Heart Institute, has found that extreme doses of antioxidants can cause genetic mutations in stem cells. He says he virtually never recommends supplements. "I think a normal diet would suffice in every case that I know of," he told me. "And I'm worried about the little old lady who takes 20 vitamin pills a day." Marbán's deep skepticism about nutraceuticals has a long history in the medical community. In the 1940s, Dr. Ernst Boas, a famous Columbia University cardiologist, called the vitamin business "the damnedest racket ever perpetrated upon the public."
That's going a bit far — but the aura of snake oil persuaded me, eventually, to toss my remaining pills and fiber powder (although I think Usana's Nutrimeal shakes are a delicious breakfast). People ask me all the time, Did I feel different when I was taking the pills? Do I feel different now that I have stopped?

I don't wake up now with that feeling of the lion who will eat the world. But I make better food choices. On nutraceuticals, I had come to believe that health could be a set of tablets to take rather than a series of responsibilities to meet — water instead of soda, an apple instead of chips, real fish instead of a giant fish-oil capsule. You can take vitamins on the faith that they will make you better — and if you have a real vitamin deficiency, they will. But there's more science behind another way of getting your vitamins: eating right.

See photos from the exhibit Food and American Identity at the National Archives.

See why vitamins could help cure a hangover.

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