YOUR VITAMINS ARE OBSOLETE

THE VITAMER REVOLUTION:

A PROGRAM FOR HEALTHY LIVING AND HEALTHY LONGEVITY

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INTRODUCTION

VITAMIN OR VITAMER?

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The vitamins you take are obsolete, as is the entire $25 billion supplement industry. This obsolescence doesn't only cost you money, it can markedly ramp up your risk of suffering from serious illness. How does it do this and what else do you need to know to truly promote your health?

As a psychiatric physician, treating patients with a wide variety of mental health problems, I often note a physical health overlay; that is, my patients typically suffer from medical conditions in addition to their psychological ones. Trying to fully understand the connection between the two in one of my patients took me on a path of new insights.

In 2006, I started my search for an answer—any answer—to my growing concern about a female patient whose physical health had deteriorated despite the best efforts of her medical team. What I learned surprised me, and when I applied these new lessons to other patients, they benefited in ways none of us predicted.

When I first consulted with Susan, she was a forty-year-old professional needing treatment for anxiety and depression triggered by work-related stress. From a treatment perspective, Susan's case appeared pretty straightforward. Although overweight, she looked healthy. After doing some hard work in psychotherapy, including the intermittent use of medication, Susan emerged from her emotional difficulties, and her usual good mood returned. Not long afterward, she was diagnosed as prediabetic

and decided to reduce her risk of developing full-blown diabetes by undergoing gastric bypass surgery.

The surgery was a success. Susan's weight dropped, and her cholesterol, blood sugar, and other measures of health improved considerably. She felt physically well, increased her exercise, and was in good spirits for several months. Then slowly her energy level and mood began declining. Oddly enough, she also seemed to be aging at an accelerated rate, looking older than her years. This was puzzling because apart from the successful surgery and weight loss, everything else in her life was the same. I asked about her marriage, work, medications, laboratory tests, exercise regimen, relationships with family and friends, and more—anything that might explain her physical and emotional decline—but nothing stood out. Her other physicians and I simply could not understand why her health was declining so rapidly.

On a hunch, I asked her to bring in all of her medications and supplements so I could look them over. Until that moment, I had never read the labels on any patient's vitamin bottles—or on my own, for that matter—so I wasn't sure what I was looking for. I was immediately struck by the fact Susan's multivitamin tablets contained 8,333 percent of the RDA (Recommended Dietary Allowance) for vitamin B_{12}. Why so much? Shouldn't 100 percent be enough? I also noticed the vitamin B_{12} in her supplement was in the cyanocobalamin form, and I remembered from medical school that this is an artificial form of B_{12}.

As I began to study up on vitamins and nutrition, I realized how little we were taught about these subjects in medical school. I did remember learning the body has a three-year backup supply of B_{12} in the liver (which I later discovered is false) and that, with our modern abundance of food and supplements, there is little concern about running short of this vitamin (also false). I understood at that time B_{12}'s classic deficiency disease, megaloblastic anemia, was very rare, easy to spot, and just as easy to treat. If a deficiency is identified, we were told, a standard multivitamin pill or B_{12} injection as a "quick boost" is typically all that is necessary. In short, we were given to understand the lack of B_{12} and other vitamins just wasn't an issue in the modern world.

As I continued studying up on vitamins, I wondered why folate, another of the B vitamins, was commonly formulated as folic acid in supplements. Like cyanocobalamin, folic acid is a man-made form of the vitamin, not the

naturally occurring form found in food and utilized by the human body. I had no idea whether these artificial forms were as good as the "real thing" or might be harmful, at least to some people. I wanted to find out. And the more I researched the matter, the more interesting it became.

What Are Vitamins, Exactly?

Once scientists determined there were special substances in food, they called them vitamins and sought to define them. Although they understood vitamins were essential to human survival, their exact functions remained unclear. For example, vitamins aren't used to build bodily structures in the same way the mineral calcium is used to build bones, yet bones and other structures cannot be built without vitamins. So what are they, exactly? The reference textbook titled *The Vitamins: Fundamental Aspects in Nutrition and Health*, Fourth Edition, edited by Dr. Gerald F. Combs, provides an excellent history and definition of vitamins. It says that a vitamin:

- is an organic compound distinct from fats, carbohydrates, and proteins
- is a natural component of foods in which it is present in small amounts
- is essential, also in minute amounts, for normal physiologic function (i.e., maintenance, growth, development, reproduction)
- causes, by its absence or underutilization, a specific deficiency syndrome
- is not synthesized in the host in amounts adequate to meet normal physiologic needs

Putting it all together, then, a vitamin is an organic compound, a micronutrient naturally present in foods and essential in very small amounts for normal bodily functions and disease prevention. It is also a substance the body cannot make on its own—or, at least, the body can't manufacture this substance in sufficient amounts to maintain health. (We photosynthesize vitamin D.) The required mineral

micronutrients in our diet are inorganic elements like calcium, magnesium, iron, etc.

Vital Vitamers

One of the most important things I learned during the course of my studies is that vitamins come in many forms, and those found in supplements are not necessarily the kinds the body uses for basic cellular functions. Instead, modern vitamins are constructed from man-made artificial compounds. These artificial varieties must be processed by the body and converted into biologically active structures that can be referred to as *vitamers* (pronounced **VY**-TA-MURS). Only then can they be utilized to optimize the function of each and every cell in the body. Unfortunately for the consumer, the vitamers of B_{12} and folate (the bioactive forms) are not found in most supplements; only the synthetic molecules are used.[1]

The B_{12} molecule exists in essentially four different configurations, each differentiated by the attachment of an additional, smaller molecule. The two naturally occurring, bioactive vitamers in animals are called *adenosylcobalamin* (A-B_{12}) because of its adenosyl attachment, and *methylcobalamin* (M-B_{12}) because of its methyl attachment. You can think of these as the "vitamer forms."

Manufacturers transformed the naturally occurring vitamers into cheaper man-made vitamins by adding one harmless cyanide molecule. The result is the artificial *cyanocobalamin* (C-B_{12}), the chemical found in almost all of our supplements. Now the body must convert C-B_{12} back into one of the vitamer forms before it can be used. The fourth form, *hydroxocobalamin* (H-B_{12}), so named because of its hydroxyl attachment, is manufactured by bacteria "in the wild" or by bacteria in a factory, and it is the form often used for injections. It, too, must be converted by the body into one of the bioactive forms before the body can use it.

Sample Supplemental Facts on Bottle Similar to Susan's

Supplement Facts

Serving Size: 1 Tablet Servings Per Container: 30

	Amount Per Tablet	% Daily Value
Vitamin B6 (as pyridoxine HCl)	5mg	250%
Folate (as folic acid)	400 mcg	100%
Vitamin B12 (cyanocobalamin)	1000 mcg	16,667%
Biotin	25 mcg	8%

Right in the middle of my literature research, I stumbled upon the probable reason Susan was ingesting 8,333 percent (others take 16,667 percent) of the RDA for B12 and was still not getting enough: Only about 1 percent at most of the C-B12 form found in her supplements can be absorbed by the body. That's because the artificial C-B12 absorption relies on an inefficient process called passive diffusion. If you do the math, you'll see the massive amount of C-B12 in the supplement actually provided her body with at most only 83 percent of the RDA (1 percent of 8,333 percent). So, even if Susan's passive diffusion process was working perfectly, the vitamins were made perfectly, and her body was absorbing the maximum amount possible, she would still fall 17 percent behind the RDA every day. Relying solely on these kinds of supplements for her B12 intake, Susan would have to take more than 10,000 percent of the RDA just to stay even. And if she didn't, within a short period of time, she could be very much behind and showing early subclinical (that is, not detectable by the usual tests) signs of B12 deficiency.

I then realized by trying to get her B12 by taking a multivitamin, Susan was making her problem worse. Multivitamin manufacturers typically combine vitamin C and iron with the B12, all in one tablet. Unfortunately, these substances tend to bind together to form a macromolecule—a very large molecule—the body cannot absorb.[2] When they are not absorbed, the vitamins are eventually flushed away. Susan might not absorb any B12 at all despite the manufacturer's claim of 8,333 percent RDA.

What You and Your Doctor Don't Know Can Hurt You

Although I could have devoted this book to the function and importance of every vitamin, I decided to focus on B12 and folate for two reasons. First,

both vitamins are vital for maintaining cellular energy and cellular hygiene and both influence the way DNA is expressed. Second, a deficiency of either vitamin can cause significant problems body-wide, including permanent nerve damage, memory problems, fatigue, and depression. And yet these two nutrients are generally overlooked as the causes of these maladies. Symptoms typically have to be severe before a doctor will test for a B_{12} or folate deficiency. Even when a deficiency is diagnosed, the prescribed treatments are likely to fail. Why? It all boils down to one major issue: Few healthcare professionals and patients understand the difference between vitamins and vitamers. This lack of knowledge about B_{12} and folate puts millions at grave risk for serious problems. Below are some little-known facts I will explore in the chapters to follow:

- Most medical training and textbooks state that there is a three-year reserve of B_{12} in the liver. All healthcare is based on this incorrect assumption. The liver does not and cannot store *water-soluble* B vitamins. Many medical treatments could be more effective if this B_{12} challenge was addressed and proactive B_{12} initiated.
- Only 30 to 40 percent of people have enough of the enzyme that efficiently converts the folic acid found in supplements and grain products into folate, the bioactive form used by the body.
- Bioavailability of folate from a wide variety of foods varies widely. (The percentage of a substance ingested that actually works is its bioavailability.) Spinach has a high iron content but a low iron bioavailability because we can't digest it out of the plant fiber.
- There is plenty of B_{12} and folate in red meat, but 50 percent of people over the age of fifty cannot manufacture enough stomach acid to break down the protein to release these vitamers.
- The widespread use of medications to reduce stomach acids, such as H-2 blockers and proton-pump inhibitors, can lead to a medically induced B_{12} deficiency, as can the exposure to nitrous oxide anesthesia used for surgical and dental procedures.
- The enzyme that changes folic acid into bioactive folate, known as MTHFR, is blocked by many medications, including NSAIDs,

antibiotics, diuretics, aspirin, birth control pills, hormone replacement therapy, steroids, and metformin.

- The damage to sensory nerve cells due to B_{12} deficiency starts long before the shortage can be detected on blood tests for the vitamer-deficient anemia called macrocytic anemia.
- Deficiencies in B_{12} or folate are not nearly as rare or as easy to diagnose as we were led to believe in medical training.

Perhaps the best way to explain the amazing potential of vitamers is with this picture of the famous "agouti gene mice"—famous to laboratory researchers, that is.

The smaller mouse on the right is very healthy, with brown hair and a slim, muscular body. He was delivered by a mother who had been fed a proper mouse diet, complete with all the necessary vitamers. In contrast, the genetically identical mouse on the left is terribly obese, at great risk of developing dementia, diabetes, and heart disease, and sporting a very unnatural-looking yellowish coat. He was born to a mother having been deliberately deprived of folate. The absence of this one vitamer was all it took to set up entire litters for lifetimes of disease by changing the way their genes behaved. How this happens is a subject we'll talk more about in future chapters. I want you to see this now, so you will understand good health is not just a matter of popping a multivitamin pill you've picked up in the grocery store. The vitamers you do or do not ingest every day are positioning you—and your descendants—for good health or disease.

(Image by R. Jirtle/D. Dolinoy 2007 and used in compliance with Creative Commons attribution 3.0 unported license)

Are We Overlooking Deficiency Symptoms?

As I sat and tried to absorb all of this information, I wondered if a lack of B_{12} or folate might be responsible for Susan's problems. I knew gastric bypass procedures such as the one Susan underwent interfered with her body's ability to absorb these two nutrients, as well as others. It's quite likely her other doctors had not considered this possibility, for their understanding of vitamin B deficiencies were probably as limited as mine. They looked no further than the standard signs and symptoms of vitamin B_{12} and folate deficiencies, as delineated by the National Institutes of Health:

Vitamin B12 Deficiency	**Folate Deficiency**
Anemia	Anemia
Fatigue	Fatigue
Diarrhea	Gray Hair
Bleeding gums	

Red, swollen tongue	Mouth sores
Pale skin	Irritability
Problems concentrating	
Shortness of breath (mostly with exercise)	
Constipation	
Light-headedness when standing up	
Confusion	
Dementia	
Depression	
Loss of balance	
Numbness; tingling of hands and feet	

It's interesting to note that these signs and symptoms are all easy to detect. Anemia can be identified with a simple blood test. If you happen to be suffering from one or more of the others, you'll know it—and so will your friends and family members. By the time these problems are observed, the deficiency will have already done serious damage to your health at the cellular and genetic levels. For example, if a B_{12} deficiency is causing numbness and tingling in your hands or feet, you may have already suffered permanent nerve damage.

This raises an obvious question: How many people are currently suffering from overlooked deficiencies of B_{12} or folate? Millions? Tens of millions? No one knows for sure, because no one is truly looking. Instead of waiting until trouble strikes—trouble that is perhaps irreversible—we should be looking for indications of a deficiency, which can range from tiny inefficiencies at the subcellular level all the way to obvious clinical symptoms. Here's how a combined B_{12}/folate deficiency list might look if we included the "too small to be obvious" problems as well as the "large" problems. Do you or yours experience any of these?

- Neurologic problems—numbness, weakness, incontinence, dementia
- Cardiovascular damage—arteriosclerosis, heart attacks, strokes, pulmonary emboli

- Immune system weakness—chronic inflammation, poor wound healing, feeling sickly
- Hematologic impairment—anemia, fatigue, increased infection, poor wound healing
- Endocrinologic upset—weight gain, obesity, diabetes, osteoporosis
- Gynecologic impairment—false abnormal pap smears, PMS, postpartum depression, infertility
- Psychiatric distress—irritability, depression, anxiety, poor concentration
- Gastrointestinal problems—weight loss or gain, constipation, irritable bowel, mouth ulcers

My patient Susan certainly suffered from some of these symptoms. Knowing that the artificial forms of B_{12} and folate don't work consistently or at all and the bypass reduced her absorption ability, I decided to offer her a new option. At that time, there was a new FDA-approved prescription supplement containing B vitamers, categorized as a "medicinal food." Susan agreed to take the supplement faithfully for at least a month. After some positive results, she continued for several more months and eventually became a thinner and more vibrant version of herself. She told me her hair and nails had thickened. This indicated a positive protein synthesis occurring throughout her entire body.

Susan's success encouraged me to continue studying B_{12} and folate, as well as their relationship to genes, inflammation, and more. Other patients trying the vitamers with additional medical conditions also responded well. I learned how these nutrients helped us evolve into modern humans and how they continue to be vital to our physical and mental health today. Unfortunately, few of us are getting enough of these vitamers, and few physicians are aware of the dangers posed by this failure. So, we as a nation continue to suffer from unnecessary diseases and conditions ranging from fatigue all the way to heart disease, cancer, dementia, and unhealthy aging.

I decided to write this book to increase awareness of the tremendous impact B_{12} and folate have on our health, the difficulty we have in getting adequate amounts of them, and the resulting dire consequences when we don't get enough. Mastering this information can be a bit of a challenge, so don't worry if you feel a little overwhelmed by some of the terms you'll come across; you can always come back to them later. Soldier on, keeping

the main points in mind. It will be well worth your effort, if for no other reason than you'll stop flushing your money down the toilet and harming your health by taking obsolete supplements. The following are some additional little-known facts that will also be explored:

- B_{12} and folate deficiency hamper the elimination of a cellular waste product called homocysteine. A buildup of homocysteine causes increased blood viscosity, blood clots, inflammation, arterial damage, unhealthy aging, and other medical problems.
- B_{12} and folate vitamers modulate the level of long-term inflammation through a process called DNA epigenetic methylation. This process regulates the protein expression of genes.
- Many textbooks are mistaken in stating the liver has the highest concentration of B_{12} in the body. It certainly has the greatest *amount* of B_{12} because it is so large, but the pituitary gland contains a much greater *concentration* of the vitamer.[3] This little-known fact has tremendous implications for health and disease because the pituitary helps regulate most hormone production in the body.
- Japan sets a high level for normal B_{12} below which neurologic symptoms start while in the US, we set the level two to three times lower at the level below which anemia starts. This means that sensory nerve damage starts before anemia changes even appear in the lab tests your doctor ordered.
- Folate and B_{12} are co-enzymes, so both must be present in adequate amounts for a few essential biochemical reactions to work, such as cellular energy production.
- Vaccinations, such as the pneumococcal vaccines, can be significantly less effective when vitamin B levels are reduced.[4]
- The availability of B_{12} is most likely the biochemical vehicle by which population growth is ultimately controlled.
- When B vitamers are taken by vegans and vegetarians, they can actually maximize the benefits of their dietary choices and reduce fertility difficulties.

- Regular use of B vitamers decreases the craving for red meat, promoting personal health and ecologic benefits.
- Only humans have a high concentration of methyl-B12 in our blood because of our unique brains and circadian rhythm.
- If shellfish were not such a great supply of B12 and folate, all humans on earth would be speaking various Neanderthal dialects rather than a Homo sapiens language.

In sum, there is a deficiency of vitamers in our food, our supplements, and our bodies. Switching to B12 and folate in the bioactive forms can make a significant positive change in your health. They will help you defend against the internal and external challenges coming at you at an increasing rate.

We will now explore *The Vitamer Revolution*, the nexus of immune health (inflammatory response), epigenetics (environmentally influenced genetics) and vitamers (bioactive vitamins)—the science behind the future of your health.

Complexity

In writing this book, I am striving to explain a connection between three complex scientific domains: bioactive vitamins, epigenetics, and inflammation. There is so much factual material available from so many sources that I could not reference them all, so I am giving the known basics and my interpretation of them. I am not a genetic biochemist, but I have used my medical background to make these subjects more accessible for everyone. There will be some repetition of biochemical details and studies as they are important to fully understand the discussion of each subject at hand.

To the novice I will appear an expert, to the expert a novice. SZ