

Vitamin Poisoning

**Are we destroying our health with
vitamin supplements?**

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Vitamins are readily available and sold in many different formulations, they're also added to common foods such as dairy, cereals, nutritional shakes and baking flour. We were taught to believe that vitamin supplements are beneficial and indeed under certain circumstances, such as with immuno deficiency diseases, vitamin supplementation regimens have shown to be helpful in relieving symptoms similar to drug administration. What we haven't been told is that in large dosages, as commonly prescribed by physicians or recommended by vitamin manufacturers, vitamins can become overwhelmingly toxic and the same vitamin treatment that potentially benefit sick individuals may actually devastate healthy individuals. To understand how vitamin poisoning occurs, we need to examine the three following issues: first, why so many of us become vitamin junkies? Second, how this very compulsive public need to shove in megadosages of vitamins has been exploited by the vitamin industry? And third, what are the real effects of vitamin supplementation on our cells, tissues and overall health?

The need to take vitamin supplements

There is a widely held perception that human diseases are largely caused by vitamin deficiencies and therefore, supplementation with megadosages of vitamins can be beneficial in preventing disease. This view is not fully supported by medical evidence, nonetheless it is still propagated and has been explored by commercial interests such as for example, the inclusion of vitamin C in cold remedies, the addition of vitamin A and D to milk products, the enrichment of oils and margarines with vitamin E, the addition of vitamins to nutritional shakes and the non-regulated sales of vitamin A and E supplements.

There are plenty of articles that encourage megadosage vitamin treatment. Generally speaking, virtually all available information on vitamin supplementation (as provided by supplement companies) attack the minimum recommended daily allowance (RDA) for vitamins as too low. Regardless to the undeniable evidence that the human body is not programmed to utilize vitamins in maximum potencies, but rather in *optimum* potencies (sometimes below the minimum RDA), the industry wants you to believe that high potencies of vitamins yield better results.

We have been told repeatedly that vitamin overload such as with vitamin C or vitamin E isn't just beneficial in preventing the common cold, but also effective in killing cancer cells, chelating heavy metals, curing blood sugar disorders and counteracting aging. Our society has been trained to think in military terms when dealing with health issues. We habitually use terms such as "fighting illness", or "burning fat". It is perhaps understandable that there is a widely held perception that high potency vitamins are more powerful with a stronger capacity to "kill" disease than low potency vitamins. Most people today truly believe that high potency vitamins are superior to low potency vitamins regardless to how they're made – whether they're synthetically produced from chemicals or naturally extracted from food sources. Consequently, we have been becoming addicts to vitamin megadosages and the vast majority of us are not even aware of this. As you'll soon see, vitamin abuse is a serious issue that requires very close attention.

Can we do well without using vitamin supplements?

Apparently, in today's world it's virtually impossible to do well without nutritional supplements. Supplementation often presents the only practical means to grant an adequate intake of nutrients. Due to soil depletion, industrial food processing, storage conditions and often low accessibility to fresh nutrient-dense food, it becomes imperative to supplement our diet with vitamins and other essential nutrients which are missing in our food. And the people who need supplementation most, are those under an increased oxidative stress including people routinely engaged in intense physical training, people with immuno-deficiency diseases, and the elderly. Antioxidant nutrients have shown to help lower the metabolic stress caused by exercise or disease and thus protect cells and tissues from oxidative damage.

Nonetheless, we need to know how to make the right choices. Not all nutritional supplements are as beneficial as claimed and an excess of any substance including vitamins can be potentially as harmful as its deficiency. We'll continue with this soon, but for now let's examine the theory behind the usage of synthetic vitamins.

The orthomolecular theory

There is a growing school of nutritionists called *orthomolecularists* who argue that there is no difference between a "synthetic" and a "natural" vitamin molecule. According to this theory, biologically identical (*bioidentical*) molecules are indistinguishable from those synthesized by plants or animals. The orthomolecular theory (ortho-right) claims that we must support our bodies with the "right molecules" that are required to sustain life and that receptors on the surface of animal cells control the uptake of individual molecules regardless of how or why these molecules appear in the blood stream... Though lacking scientific substantiation, this theory has been adapted by medical authorities who recommend synthetic vitamin supplements, containing large concentrations of isolated vitamin molecules to serve as alternative medicine.

Millions of people today are taking vitamin supplements as the only means to prevent nutritional deficiencies, believing that it actually compensates for poor eating habits and bad diets. The highest pound-to-pound vitamin consumers are fitness advocates, athletes, the sick and the elderly, who have been told that their vitamin requirements are higher than normal and therefore require larger dosages. What remains largely overlooked is one single fact: *there is no evidence that people who take vitamin supplements are doing better than those who don't*. In fact, there are some indications that vitamin supplementation may actually shorten life span and may even increase cancer probability, such as in the case of synthetic vitamin E and beta carotene. As you'll soon see, the evidence shows that vitamin supplements can become toxic to the body in the following circumstances:

- ✔ if they're synthetically produced
- ✔ if taken in overly high unnatural dosages.

Poisonous vitamins

Up until recently, it has been commonly assumed that only fat soluble vitamins can potentially become toxic. Since fat soluble vitamins A, E, D, and K can be stored by the body and accumulate in overly high toxic levels when taken in large dosages, it has been recommended to be cautious with their intake, a recommendation which nevertheless has been ignored by vitamin manufacturers who keep selling formulas with high contents of fat soluble vitamins.

Vitamin poisoning is not a simple problem. The issue involves lots of misinformation and misunderstanding. The information provided by vitamin manufacturers do not always reveal the truth, certainly not the whole truth. People today are easily fooled to believe that it's worth popping pills that can yield hundreds of times greater vitamin concentration than real food. What the public hasn't been fully aware of is that the human species evolved to beneficially utilize nutrients only as they naturally occur in food and *not* in any other way.

The early human diet was largely vegetarian, humans have adapted to utilize nutrients and vitamins from plant sources in the safest, most efficient way and at exactly the right concentrations needed for the body's metabolic needs. Human biology is undoubtedly vegetarian-oriented. We all carry an inherent enzymatic capacity to convert complex plant nutrients into bioactive compounds, vitamins, minerals and antioxidants, all of which are utilized by the body through a tightly feedback control. This is how we evolved to be. We can safely utilize natural plant carotenes into vitamin A, we can safely optimize our vitamin D from germs and seeds as well as through exposure to UV sunlight and we can safely utilize vitamin E from eating raw nuts and seeds, without any risk of toxicity.

However, as great as our capacity to utilize natural nutrients from food is, we are lacking the capacity to properly utilize synthetic nutrients derived from chemical processing. The human body can't regulate the absorption of synthetic



vitamins, neither can it optimize their levels. Here is what likely occurs when synthetic vitamins are administered. The highly bioactive, chemically processed vitamin molecules bypass the body's natural enzymatic pathways, giving the body the signal that its vitamin pool is fully loaded. After synthetic vitamin administration, the body is tricked to believe that it doesn't need to utilize more of the same nutrients from food. Consequently, the enzymes that normally utilize complex plant nutrients into vitamin molecules are inhibited and the body is losing its ability to fully assimilate food's nutrients, as well as the capacity to regulate and optimize healthy vitamin concentrations. In reality, synthetic vitamins are received by the body as drugs and like all drugs, they can potentially disrupt normal metabolic functions often with devastating side effects.

Toxicity Side Effects of Excess Fat Soluble Vitamins

Vitamin A: abdominal pain, vomiting, headache, lethargy, eczema, patchy hair loss, edema, anemia, respiratory tract infection, chronic liver disease

Vitamin E: allergic reaction, breathing impairments, swelling of the tongue, fatigue, headache, nausea, blurred vision, excessive bleeding (anticoagulation due to inhibition of vitamin K), increased oxidative stress, increased hypertension, decreased life span

Vitamin K: supplementation with a synthetic form of vitamin K *Menadione* has been associated with liver damage. Some reports indicate a significant association between high intramuscular levels of vitamin K and cancer.

Vitamin D: even though vitamin D poisoning is rare, toxicity can occur under certain medical conditions such as primary hyperparathyroidism, tuberculosis and lymphoma. Note that vitamin D is completely safe when produced by the body itself through UV sunlight exposure.

As for the water soluble vitamins C and Bs, these have been generally considered safe simply because water soluble vitamins are not stored by the body. Since any excess of water soluble vitamins is excreted in the urine, they presumably can't accumulate in toxic levels and therefore are regarded as safe. But are they safe indeed? Let's review how safe the water soluble vitamins are, starting with the one considered the safest of all – vitamin C.

Vitamin C – Cure or curse?

The belief that megadosages of vitamin C can cure the common cold and prolong life was given credence by the American scientist Linus Pauling (1901-1994). The basic premise of his advocacy of vitamin C in large dosages was that there is somehow a "design flaw" in the human genome which disables us to produce vitamin C like other animals. According to Pauling and his advocates, we need to compensate for our genetic fault with 10,000 – 12,000 mg of vitamin C daily as adults, to prevent or cure disease.

The recommended daily allowance (RDA) of vitamin C is 60 – 90 mg per day. Men are advised to consume more vitamin C than women and individuals who smoke or are engaged in intense physical activities are encouraged to consume more vitamin C than average adults. This recommendation is due to the fact that smoking and exercise deplete vitamin C in the body, leaving cells vulnerable to oxidative damage. The upper intake level for vitamin C was set at 2000 mg a day for adults by the Food and Nutrition Board in 2000.

The vitamin C molecule, ascorbic acid (ascorbate) seems to be critically important to all animals and humans. It is vital to the production of collagen, it helps recycle vitamins A and E, it helps potentiate iron absorption and support adrenal functions particularly during times of extreme stress, but most notoriously, vitamin C prevents and cures scurvy disease, even in small potencies such as those naturally occurring in a single lemon or an apple. Scurvy is rarely seen today except in alcoholics or extreme cases of drug addictions, eating disorders or starvation. The disease causes bleeding and inflamed gums, loose teeth, poor wound healing, easy bruising, joint pain, muscle wasting, and a total metabolic decline with mortal consequences if untreated.

In theory, vitamin C ascorbate can help cure ailments, build tissues, counteract stress and promote great health, this is at least how ascorbic acid has been advertised. But what seems great in theory isn't always as great in reality. Let's examine the actual effects of ascorbic acid supplementation in real life. The following information is based on recent studies, I choose to feature the following reports since I believe they may help put the record straight regarding ascorbic acid supplementation in particular, and synthetic vitamins and their potential pathology, in general.

Ascorbic acid supplementation impairs muscle's mitochondrial function and adaptability to exercise.

A recent article in the *American Journal of Clinical Nutrition* (Vol. 87, No. 1, 142-149, January 2008) reveals that supplementation with vitamin C ascorbate devastates the muscle, causing impairment in mitochondrial function, loss of endurance, and inhibition of the body's own antioxidant enzymes superoxide dimutase (SOD) and glutathione peroxide. Levels of SOD and glutathione enzyme are known markers of health and any substance that causes a substantial decrease in the levels of these essential antioxidant enzymes, disrupts the body's immune system, lowering the capacity to resist infection and disease. In this case, rather than being a beneficial antioxidant, vitamin C ascorbate has shown to work as an adverse pro-oxidant.

The study featured in the article was designed to examine the effect of vitamin C on training efficiency in animals and humans. The researchers were aware that ascorbic acid supplementation is highly popular among exercise practitioners. The reason: since intense exercise increases oxidative stress in the muscle (as indicated by increases in peroxidation of lipids, proteins and DNA), it then has been assumed that administration of the antioxidant vitamin C ascorbate may help protect the muscle from oxidative damage. But again, in real life things often occur differently than in theory and in this case, the findings leave no place for a doubt: ascorbic acid supplementation shatters muscle performance by actually increasing oxidative stress and suppressing some critical cellular mechanisms of adaptation to exercise.

Are all forms of vitamin C supplements potentially damaging to the muscle?

Certainly not. Unlike the synthetic vitamin C, its natural equivalent is both healthy and safe. Natural vitamin C as originally occurring in plants isn't just beneficial to the muscle, it is actually essential to the whole body.

Humans and primates can't produce vitamin C and therefore must ingest it from a dietary source. The human diet evolved to be largely dependent on vitamin C rich foods, particularly fruits and vegetables and like other primates and apes, we have evolved to actually thrive on these natural vitamin C sources. Why then, vitamin C ascorbate induces toxic effects instead of beneficial effects? Again, the reason: human biology has never evolved to accept synthetic vitamins. In its natural form, vitamin C has a different design than the synthetic vitamin. The natural vitamin C molecule *never* occurs in isolated form, but rather accompanied by complex nutrients which apparently are essential for vitamin C's bioactivity. The synthetic ascorbate however, appears in an isolated form, often in overly high concentrations which the human body hasn't evolved to properly utilize.

To be viable, vitamin C should be supplemented as it naturally occurs in food. When choosing a vitamin C supplement, make sure it is indeed derived from a natural food source and attached to its nutritional cofactors.

To further understand how synthetic vitamins become toxic to the body, we need to take a look at how the human survival apparatus has evolved to work – how the very bio-mechanisms that have kept our species alive on this planet really operate.

Stress resistance, starvation resistance and longevity

It has been widely established that the human body is not inherently programmed for today's world, but rather designed for a primordial world that existed many thousands of years ago. Anthropological evidence indicates that the human genome hasn't changed at all in the past fifty thousand years, we still carry the same genes of our cavemen ancestors but apparently the world that we live in today is different than the world we have originally adapted to. Staying alive during primordial times required the skills to *actively survive*, humans evolved to being capable of enduring intense physical tasks, gathering or hunting for food, fighting foes and beasts or fleeing if necessary. Humans also evolved to be capable of enduring periodical hunger due food scarcity. Our "primitive" genome is programmed to actually thrive in rugged conditions which mimic primordial hardship. We all carry survival genes (also called longevity genes) that increase our ability to survive by upgrading our energy utilization, strengthening our muscle, improving our capacity to resist stress and starvation, and even elongating life. And these genes are triggered when we're routinely and repeatedly confronted with physical challenges (exercise) or forces to endure food scarcity (undereating or fasting).

Animal studies have indicated that *starvation resistance* is one of the most important evolutionary traits linked to longevity. This life extending trait is attributed to a certain genetic phenotype which likely evolved to increase survival probability during times of food scarcity. Note that there is a thin line that separates between scarcity of food and lack of food. There is obviously a huge difference between eating less and not eating at all. Food shortage and starvation are problems that existed in the past and still exist today, but can be resolved by restoration of agricultural and industrial means to yield sufficient food supply. The main problem however, that our western society faces today is not food deficiency, but rather excess of food and this problem remains largely unresolved.

Apparently, we have evolved to better survive in a world of scarce than in a world of plenty and for that matter, our bodies are inherently designed to get maximum nourishment from minimum food. This is likely an evolutionary feature that had enabled our early ancestors to overcome famine or food scarcity, which were common factors of life during primordial times.

The same may hold truth for human vitamin intake; our species has successfully thrived thousands of years on this planet, without a single vitamin supplement. Why have we been so largely ignoring this simple fact? Though there are good reasons today for supporting our diet with vitamin supplementation, we need to be aware of one thing: humans have never evolved to be supported by megadose vitamins. We are inherently more frugal than we think. We do better living off the land, eating scarcely from a few accessible choices of seasonal foods, than living off the supermarket, eating excessively from multiple choices of food products. Excess is toxic and inflammatory. We can become fat, bloated and sick from excess calories and similarly we can be poisoned and sickened by excess vitamins.

Humans carry genetic codes that improve survival capabilities when routinely challenged by intense physical stress or food scarcity. Scientists speculate that these gene phenotypes give us a great evolutionary advantage. Both physical stress and lack of food are perceived by the body as survival challenges that need to be dealt with and in response, the body's survival mechanisms compensate us by upgrading our survival capabilities and extending our lifespan. Given all this, we should be aware that anything which contradicts our "active survival" program, anything that causes excess or imbalance in our body, anything that down regulates the genes that make us thrive, should be avoided or possibly counteracted.

How antioxidants turn pro-oxidants

The knowledge of how the body's survival mechanisms operate is a key to understanding how the body utilizes nutrients and vitamins. The truth is that stress is a critical factor of life. Even though, the concept that stress is beneficial and essential to life (like yin or yang) remains highly controversial.

One of the most critical elements of survival is the sustainability of the body's metabolic environment. The body is highly sensitive to changes in its metabolic environment (homeostasis) – capable of detecting fluctuations in blood sugar, decreases or increases in cellular energy and most importantly, it is highly sensitive to changes in cellular levels of oxidative free radicals. We have been told that free radicals are the bad guys that destroy our cells and tissues, whereas antioxidants are the good guys that save us from the harmful effects of these oxidative bad guys. But is it true?

Since this is a complex issue, it is imperative to reconsider this assumption and reexamine the facts. The truth is that free radicals can be damaging when accumulated in overwhelmingly high cellular levels *but* not always. In many cases such as with exercise, they actually serve as signals to improve adaptation of muscle cells to physical hardship. A certain threshold of cellular free radicals is needed to “tone” the muscle and incredibly, this very threshold of free radicals in the muscle cell is what keeps the muscle’s own energy system and antioxidant defenses in tact.



Low threshold concentrate of free radicals in the muscle, such as after short term exercise, is beneficially acting as a signal to enhance defenses rather than being deleterious. The free radicals threshold in the muscle is an essential part of the mechanism that makes exercise so beneficial to human health.

Two of the most notable effects of exercise are I: the increased expression of longevity promoting antioxidant enzymes in skeletal muscle (mitochondrial SOD and glutathione peroxidase GPx) and II: the increase in muscle mitochondrial content. It is now known that endurance capacity is dependent mainly on mitochondrial content and antioxidant defenses of skeletal muscle.

And here is the point: these awesome, beneficial effects of exercise on muscle conditioning can be seriously compromised by synthetic antioxidant supplements. In the case of vitamin C, what scientists have been realizing is that ascorbic acid supplementation, by all means devastates the muscle by overwhelming the muscle’s minimum free radical threshold and thereby decreasing both mitochondrial biogenesis and antioxidant capacity in the cell.

Ascorbic acid is not the only vitamin supplement that potentially can devastate the muscle. In fact, several reports have shown antagonizing effects of other antioxidant vitamins as well. As early as 1921, it was shown that vitamin E supplementation in 400 iu/day (a commonly used dosage) caused an unfavorable decrease in endurance performance. In 1996 and 1997, a Scandinavian journal published 2 reports showing the adverse effects of antioxidant supplementation (Ubiquinon-10) on high intensity training performance. In 2001, Coombes et al reported that supplementation with vitamin E and alpha lipoic acid depressed muscle contractile force in animals. One year later, it was shown that supplementation of racing greyhound dogs with 1g vitamin C/day for 4 weeks significantly slowed their speed.

Given all this, the common practice of taking ascorbic acid and other synthetic antioxidant supplements for both health related and physical performance related improvements, should be seriously questioned.

The B vitamins syndrome

B vitamins are water soluble compounds, serving as catalysts and cofactors in multiple enzymatic processes involved in energy production, hormones synthesis, neurotransmitters activation and many other critical metabolic functions. Because of their great appeal, B vitamins are commonly added to food stuff for enrichment of nutritional content. However, even though largely regarded as safe, B vitamins are now gaining the reputation as risky substances, particularly when applied in large concentrations. The most notable risk involving a B vitamin supplement is its potential excess, which ironically can cause depletion of other B vitamins, as well as toxic side effects.

For instance, excessive vitamin B1 can deplete other B vitamins, disrupt insulin and thyroid production. Excessive vitamin B3 has shown to cause liver damage. Megadosages niacin have also shown to adversely affect individuals who suffer from glaucoma, gout, liver disease and peptic ulcers. Note that megadosages niacin have been commonly prescribed today as an alternative medicine to lower cholesterol levels. Excess of synthetic vitamin B6 pyridoxine has shown to cause liver damage when used in long term “therapeutic” dosages (over 200 mg/daily). These so-called therapeutic potencies of B6 are currently available over the counter in stores nationwide. Even folic acid, which is regarded as safe and highly beneficial, could turn to be toxic in high doses (5-10 mg) with symptoms including bloating, nausea and upset stomach. High dosages of folic acid may also result in increased occurrence of seizures among individuals suffering from epilepsy.

Why the water soluble, presumably safe B vitamin supplement that can be excreted via the urine are nevertheless risky? Because as we've seen, synthetic vitamins lack the natural design of food based vitamins. Again, the body can only utilize vitamins as they naturally occur in food, regardless to whether these are water soluble or fat soluble. In their naturally occurring state, vitamins always appear in a group, balanced with other nutritional cofactors and in the right biological concentrations. In its natural form such as in plant food, a B vitamin is not only 100% safe and non-toxic, it is very unlikely that it will ever be absorbed in an excess.

Contrary to natural vitamins, their isolated synthetic equivalents are inherently problematic, There is no single vitamin manufacturer in the world that has yet figured out how to provide us with what nature has been providing us since the genesis of the human species: *The right balance and complexity of nutrients*. Regardless to how fancy, sophisticated and "advanced" a vitamin formula is, it can never be properly balanced and safely nourishing unless it is made with all naturally occurring ingredients as in food.

How to detect the difference between natural and synthetic vitamin supplements



The most notable difference between natural and synthetic vitamin supplements is in their claimed potencies. Natural vitamins as in plant foods are never highly concentrated. Nature provides us with *balance, complexity and bioavailability* but not with a high potency. Conversely, synthetic and crystalline (chemical isolated from natural source) vitamins do appear in high unnatural potencies.

When examining products labeled as natural vitamins, note that labels of truly natural food based vitamins, should indicate the exact natural source from which each of the vitamins is obtained. Simply put, if the vitamin concentrations are high and/or their natural sources aren't listed, most likely these vitamins are synthetic. Chemical sources for synthetic vitamin supplements include petrochemicals, coal tar, chemically manipulated sugar and inorganic minerals.

Conclusion

We require food and vitamins to survive. Due to common nutrient deficiencies as well as inaccessibility to fresh, nutrient dense food, we need to supplement our body with vitamins and other essential nutrients. However, what many of us have been failing to realize is that in order to thrive, our bodies require *optimum* levels of nutrients, as naturally occurring in food and not maximum levels of nutrients, as chemically isolated or synthetically produced by the industry. It may take another decade or perhaps another century for scientists to fully understand the magnitude of benefits we get from the multiple complexities of whole food's nutrients and accordingly establish undeniable principles upon which the human diet should be based. Until then, we need to rely on the logic behind our life. Biology means the "logic of life" and this *logic* clearly indicates that our health is programmed to thrive on food nutrients, not chemicals.

For more information, please visit

<http://www.defensenutrition.com>

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