

Benefits of Vitamins for Reducing Disease Risk and Slowing Aging

(Empirical Justification)

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I will be working on a secondary document that includes the next set of important supplements such as Green Tea pills, CoQ10, Grapeseed Extract, Alpha Lipoic Acid, Carnosine, and Resveratrol.

Introduction

“Despite constant media publicity, the majority of Americans do not ingest enough fruits and vegetables each day. In fact, a recent Johns Hopkins study found from 1999-2002, only 28% and 32% of American adults met the United States Department of Agriculture (USDA) guidelines for fruit and vegetable intake respectively.¹ Yet, scientists are increasingly telling Americans that they must consume these kinds of plants in order to avoid a myriad of age-related problems.”

¹ *Am J Prev Med.* 2007 Apr;32(4):257-63

<http://www.lef.org/newshop/items/item01234.html>

70% of Americans are not getting the Recommended Daily Allowance of vitamins and minerals. Furthermore, the RDA is an *inadequate amount* in a great deal of cases. The RDA amount is set forth as a bare minimum intake level to prevent diseases and deficiencies. A good example of this point is Vitamin C. The RDA of 60 mg for Vitamin C is to prevent acute scurvy, not to provide optimal health. So how much Vitamin C should we be ingesting on a daily basis? While I would prefer not to clutter the introduction section with an aside about Vitamin C, a short discussion of this nutrient will be very useful. It should convince you that RDA values are not to be taken as the optimal or maximum amount that a nutrient should be consumed on a daily basis. Instead, evolutionary and scientific factors should guide the way to determining the optimal amount.

So, if the RDA of 60 mg is not enough Vitamin C, how much should we be consuming? Well, many people are not aware of the fact that humans used to produce their own Vitamin C. I quote the following from a webpage that provides some good background into our history as humans (note that “ascorbate” refers to Vitamin C):
“It helps at this point to explain some genetic history. Only a few animals (the higher apes, the guinea pig, and a species of fruit bat) ever show coronary heart disease. Heart disease, however, appears *only* when these animals are fed a diet that is lacking in adequate amounts of vitamin C.

Zookeepers learned the connection between vitamin C and heart health a long time ago. When their gorillas were fed a diet of early versions of processed “gorilla-chow,” instead of a diet rich in vitamin C from fresh fruits and vegetables, they got sick and developed heart disease.

In contrast, bears -- whose cholesterol levels can be three times as high as man’s and whose heart rates slow way down during hibernation – remarkably never show any atherosclerosis.

So what’s going on in bears and other animals that is missing in humans, apes, guinea pigs and some fruit bats?

Endogenous Production of Ascorbate and a Genetic Mutation

Other animals produce vitamin C endogenously (which means most animals manufacture ascorbate *inside* their bodies), and this production of vitamin C is essential to maintaining health, including maintaining healthy arteries.

For example, a 150-pound goat has a typical blood concentration of ascorbate equivalent to taking 13,000 mg (13 grams) of vitamin C per day. And, ascorbate concentrations rise much higher in times of stress. Compare this abundance of vitamin C in a goat with the paltry 60mg recommended daily allowance for humans. Consider further the percentage of people who do not get enough vitamin C from their diets, and it’s no wonder that heart disease is so prevalent.

Some millions of years ago, a genetic mutation occurred, causing humans to rely on their diets for vitamin C. This mutation was not life-threatening, however, because our early ancestors thrived in the tropics, where vitamin C was in ready supply in fresh fruits and vegetables.

Scurvy (and heart disease) became a real problem for ancestors who settled in other regions of the world, areas with less readily-available dietary ascorbate.

During the Ice Ages, however, many of our ancestors did indeed succumb to scurvy and heart disease, when plant-foods were not as plentiful.

Ancestors who were able to survive possessed a valuable genetic mutation, whereby damaged (leaky) blood vessels could be patched by a “back-up mechanism,” an animal food component called cholesterol. Modern humans inherited this ability to use cholesterol to make repairs, which, in other animals, are made through an abundance of freely-circulating vitamin C.”

<http://www.ourhealthcoop.com/pauling.htm>

“Optimum ascorbate supplementation prevents the development of [cardiovascular disease] CVD independently of the individual predisposition or pathomechanism. Ascorbate reduces existing atherosclerotic deposits and thereby decreases the risk for myocardial infarction and stroke. Moreover, ascorbate can prevent blindness and organ failure in diabetic patients, thromboembolism in homocystinuric patients, and many other manifestations of CVD.

[CVD] is the direct consequence of the inability of man to synthesize ascorbate in combination with insufficient intake of ascorbate in the modern diet. Since ascorbate deficiency is the common cause of human CVD, ascorbate supplementation is the universal treatment for this disease.”

<http://orthomolecular.org/library/jom/1992/pdf/1992-v07n01-p005.pdf>

“Stone⁵ and Pauling⁶ calculated, based on the diet of our primate cousins⁷ (similar to what our common descendants are likely to have consumed when the gene mutated), that the optimum daily requirement of vitamin C is around 2,300 milligrams for a human requiring 2,500 kcal a day.” Given that some vitamin C is obtained in diet, 2,000 mg is a good supplemental dosage recommendation to get close to the optimal daily requirement.

http://en.wikipedia.org/wiki/Vitamin_C#Genetic_rationales_for_high_doses

It is interesting to note that “if you want to get all your vitamin C from foods, consumption of the recommended 5 to 7 servings of fruits and vegetables a day is likely to provide 200-250 milligrams.”

<http://www.lewrockwell.com/orig/sardi9.html>

Most Americans are not getting 5 to 7 servings of fruits and vegetables a day. Even most those who *are* meeting this amount are probably not doing it consistently. Furthermore, even for the small minority of the population that are consistently getting 5 to 7 servings of fruits and vegetables a day, the 200-250 milligrams they obtain is still short of the optimal recommendation of 2,300 by more than a factor of 5. This means that *one cannot get optimal dosages of Vitamin C from food alone and that supplementation is necessary*. Ray Kurzweil notes that the term “supplementation” is misleading because it implies something that is optional. Not only do supplements provide *consistent optimal nutrition*, but they also provide nutrients at levels that we *cannot get from food alone*. Throughout this paper, you will see many citations to medical papers about cases where *supplementation* (as opposed to trying to obtain optimal nutrients from foods) provided astounding health benefits including dramatic reduction of risk for degenerative disease and slowing of aging.

The reason I have been focusing so much time and effort on supplementation is because I think it should be the core for anyone trying to be very healthy. There are two major reasons for this:

1. Supplements provide *consistent, optimal nutrient levels* in a way that is *extremely practical*

- a. It is not practical to *consistently* eat the *breadth, depth, and quantities* of foods that are necessary for optimal health.
 - b. Anyone can buy a pill separator and supplements, separate them out once a week, and take them in the morning and at night with some water. This fits into any schedule, no matter how busy, and as you will see, is incredibly affordable even for those on tight budgets.
 - c. Many optimal nutrient levels cannot be obtained through food alone.
2. There are a plethora of empirical studies showing *incredible benefits for reducing risk of degenerative disease and slowing aging* just through supplementation ***alone***.

Most people don't eat fruits and vegetables because it is not practical. They like foods that are convenient, taste good, are served at common dining places, etc. People are also stuck in bad habits and it is not practical to radically overhaul one's diet. Therefore, my personal opinion is that supplementation is a perfect place to start. Anyone can take a set of pills in the morning and at night. It takes almost no time at all and it is very easy to get into the habit. It is hard enough for people to avoid french fries, yet most nutritionists preach to eat mostly fruits and vegetables. I am a pragmatist and a realist who firmly believes that extreme benefit can be provided through *supplementation alone*. I also strongly believe that diet and exercise should be adjusted to make one even healthier, but these areas can be worked on gradually, one step at a time. Aggressive supplementation should not only be the foundation of a healthy body, but also is a terrific first step that is easy to assimilate into any lifestyle *immediately*.

I have collected a great deal of empirical data for each of the Vitamins in this document. I have tried to provide hard numbers and statistics wherever possible to show the dramatic reductions in risk for major degenerative diseases. Summaries of each nutrient's major benefits are provided as well as specific details and citations.

I sincerely hope that you will take this document extremely seriously. I have thoroughly researched these nutrients and am fully confident that there are immense benefits to be derived from supplementing with the recommended amounts. Nothing is more important than one's health. This document should convince you that you can tremendously improve your health, vastly reduce the risk for disease, slow your aging processes, feel better, think better, and live a longer, more fruitful life. Supplementation is extremely practical, cheap, and convenient. *Do not wait* until you are diagnosed with cancer. You do not want to go through chemotherapy. *Do not wait* until you have a heart attack. Bypass surgery will not give you many more years of life. Do not be like the majority of society and let disease cause suffering and hardship for you and the ones you love. Do not wait until a disease strikes you and then try to run damage control and attempt to mask symptoms. Start supplementing immediately to reduce the risks of disease to virtually nothing. Then, moderate diet changes and exercise can be incorporated into your routine in a way that is gradual and practical.

Aging and disease will not exist 15-20 years from now due to advances in science. My confidence in this statement is 99.9% due to the law of accelerating returns (double exponential growth of information technology). It would be a *terrible tragedy* to die in the next 15 years before these advances effectively defeat mortality and disease completely. Be proactive and start today. Nothing is more important.

I hope the information in this document is helpful and I wish you the best of luck in optimizing the health of yourself and those you love.

Summary of Benefits for each Vitamin

Definition of **Tolerable Upper Limit**: “the highest level of a daily nutrient intake that will most likely present no risk of adverse health effects in almost all individuals in the general population”

<http://www.britannica.com/EBchecked/topic/1085231/Tolerable-Upper-Intake-Level>

Please note that the recommended dosages in this document are always **below** the Tolerable Upper Limit!!!!!!

Vitamin C

Lifespan	Cancer Prevention	Heart Disease	Diabetes	Glaucoma	Recommended Dosage per Day	Tolerable Upper Limit
20% Increase in avg. life span ¹² 20 - 57% Risk Reduction for all causes of mortality ¹³⁻¹⁶	Inhibits tumors ²⁴ Inhibits cancer growth ²⁴ 50% Risk Reduction for colon cancer Lowers risk for all cancer	<i>Prevents and cures</i> heart disease in high dosages ²⁶ Dosages >700 mg/day Reduce Risk of dying from Heart Disease by 62% ²	62% Risk Reduction ²⁵	Significantly lowers risk ²	2,000 mg ⁴	2,000 mg ¹⁰ (To prevent diarrhea) No real upper limit to Vitamin C.

Vitamin D

Heart Disease Prevention	Cancer Prevention	Helps Prevent Osteoporosis	Enhances Immune System	Recommended Dosage per Day	Tolerable Upper Limit
40% Risk Reduction ²	60% Risk Reduction ¹	Deficiency associated with greater risk of hip fractures ⁶	Potent Immune System modulator ⁷	2,000-4,000 IU ¹	10,000 IU ⁴

Vitamin E

Heart Disease Prevention	Cancer Prevention	Alzheimer's Prevention	Recommended Dosage per Day	Tolerable Upper Limit
30-40% Risk Reduction ^{1a}	32% Risk Reduction of Prostate Cancer (2 nd most common cancer in men).	60% Risk Reduction ^{1b}	800 IU ¹	1,500 IU ³

	41% Reduction of Prostate Cancer deaths. ⁵			
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Selenium

Lifespan	Cancer Prevention	Immunity	Osteo-Arthritis	Protection against heavy metals	Recommended Dosage per Day	Tolerable Upper Limit
35% Increase in median life span ¹ 22% Increase in maximum lifespan Risk Reduction ¹	50% Overall Risk Reduction ² 63% Risk Reduction of Prostate Cancer (2 nd most common cancer in men) ² 58% Reduction of Colon Cancer ² 48% Reduction of Lung Cancer ²	20 times lower chance of dying from HIV-related causes if you have AIDS ³ 118% increase in lymphocyte cytotoxicity ⁴ 82% increase in natural killer cell activity ⁴	Selenium <i>deficiency</i> can contribute to osteo-arthritis ⁵	Selenium protects against toxic metals such as mercury ⁶ and arsenic ⁷	200 mcg ⁸	400 mcg ⁹

Calcium

Blood Pressure	Colon Cancer	Premenstrual Moods	Weight Loss	Maintain Healthy Teeth and Bones	Recommended Dosage per Day	Tolerable Upper Limit
5.5 point reduction of systolic blood pressure ⁶ 3 point reduction of diastolic blood pressure ⁶	30% Risk Reduction (<i>if taken as a supplement</i> as opposed to through food) ⁵	Experience significantly fewer symptoms ⁶	High calcium intake suppresses hormones that stimulate the production of fat and inhibit its breakdown ⁶	Bones gradually surrender calcium for needs elsewhere in your body if you're not consuming enough. ⁶	Age 19-50: 1,000 mg ⁶ Adults over age 50: 1,200 mg ⁶	2500 mg ⁷

Magnesium

Blood Pressure	Diabetes	Heart Disease & Stroke	Bone formation	Nerve and Muscle Relaxation	Recommended Dosage per Day	Tolerable Upper Limit

2.7 point drop in systolic ⁵ 1.5 point drop in diastolic ⁵	Magnesium influences the release and activity of insulin ¹	Lowers the risk of heart disease. ¹ Lowers the risk of stroke. ¹	Gives bones physical structure ²	Keeps nerves relaxed which prevents muscles from over-contracting ²	500 mg	350 mg ¹ (dosages from 1,000-5,000 mg have been shown to cause diarrhea)
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Fish Oil: Omega-3 Essential Fatty Acids (EFA's)

Heart Disease	Stroke	Prostate Cancer	Regulation of Blood Sugar Levels	Reduction of Bad Fats in System	Other Benefits	Recommended Dosage per Day	Tolerable Upper Limit
49% Risk Reduction of Heart Disease Deaths ¹ 48% Reduction in death from Irregular Heartbeat ¹	50% Risk Reduction ⁵	6 times lower chance of dying from prostate cancer ²	The more you use, the more normal blood sugar becomes ³	25% Reduction of saturated fats, trans fats, and partially hydrogenated fats ³ 65% Reduction of triglycerides ³	Many other benefits, please read below under Other Benefits	EPA 1,000-3,000 DHA 700-2,000	None set ⁴

B Vitamins

Energy Production	Healthy Nervous System (combats stress, anxiety, depression)	Good Digestion	Healthy Skin, Hair, and Nails	Synergy	Recommended Dosage per Day	Tolerable Upper Limit
Prevent "decreased energy production, lethargy and fatigue"	"A deficiency in any of the Vitamin B Complex vitamins can lead to feeling stressed, anxious and depressed." ⁵	Prevents impaired digestion and therefore prevents deficiency of essential nutrients ⁵	Deficiencies in B vitamins can lead to issues with skin, hair, and nails ⁵	Deficiency in any one B Vitamin can lead to poor functioning of any or all of the others even if they are in good supply" ⁵	<i>B1 (Thiamine):</i> 100-200 mg <i>B2 (Riboflavin):</i> 50-100 mg <i>B3 (Niacin):</i> 200 mg <i>B6 (Pyridoxine):</i> 75-100 mg <i>Folic Acid:</i> 800 mcg <i>B12:</i> 1000 mcg ⁶	B Vitamins are Water-soluble so toxic reactions are extremely rare ⁷

Supplement Chart

Same color supplements means that the various nutrients are all provided in the same product (ex: b-vitamins (B1, B2, B3, B6, B12) can all be obtained by one supplement pill (b-complex pill). Supplements in gray are contained in a multivitamin. Take 2 multivitamins a day (morning and night).

Nutrient (colors indicate which vitamins can be obtained through 1 common supplement)	ONA (Optimal Nutritional Allowance)	Amount in Recommended Supplement (total amount in all servings)	Link to Buy	Cost per month (if taking recommended servings daily)	Serving Instructions (How much to take and when)
Omega-3 EFAs (mg)	EPA 1,000-3,000 DHA 700-2,000	EPA: 1680 DHA: 1120	Buy at BJ's WS	\$4.80	2/day w/ food, twice daily for a total of 4/day
Vitamin C (mg)	500-2,000	2,000 + 500 + 60	Buy	\$1.44	2/day (food optional)
Vitamin D (IU)	2,000 – 4,000	2,000 + 800	Buy	\$1.20	2/day (food optional)
Vitamin E (IU)	400-800	400	Buy	\$0.84	1/day (food optional)
Selenium (mcg)	100-250	200	Buy	\$1.62	1/day w/ food
Calcium (mg)	1,000-1,500	1,000 + 162	Buy	\$4.97	3/day (food optional)
Magnesium (mg)	400-600	500 + 100			
B1 (Thiamine) (mg)	10-200	50			
B2 (Riboflavin) (mg)	10-100	50			
B3 (Niacin) (mg)	20-200	100			
B6 (Pyridoxine) (mg)	50-100	50	Buy	\$2.74	2/day (food optional)
B12 (cyanocobalamin) (mg)	125-250	250			
Vitamin A (IU)	5,000	7,000			
Vitamin K (mcg)	90-120	50			
Folic Acid (mcg)	400-800	800	Buy	\$4.16	2/day w/ food
Iron (mg)	15 (premenopausal women), 0 (postmenopausal women)	36			

	ausal women), 0 (men)				
Zinc (mg)	15-30	30			
Copper (mg)	0.5-4	4			
Manganese (mg)	2-5	4			
Chromium (mcg)	120-200	240			

TOTAL COST OF OPTIMAL LEVELS OF UNIVERSAL SUPPLEMENTS PER MONTH: \$21.77

Vitamin C

Summary

Main Function: In humans, vitamin C is a highly effective antioxidant, acting to lessen oxidative stress, a substrate for ascorbate peroxidase,¹ as well as an enzyme cofactor for the biosynthesis of many important biochemicals. Vitamin C acts as an electron donor for eight different enzymes.² Vitamin-C plays an important role as a component of enzymes involved in the synthesis of collagen and carnitine.³

Lifespan	Cancer Prevention	Heart Disease	Diabetes	Glaucoma	Recommended Dosage per Day	Tolerable Upper Limit
20% Increase in avg. life span ¹² 20 - 57% Risk Reduction for all causes of mortality ¹³⁻¹⁶	Inhibits tumors ²⁴ Inhibits cancer growth ²⁴ 50% Risk Reduction for colon cancer ² Lowers risk for all cancer ²	<i>Prevents and cures</i> heart disease in high dosages ²⁶ Dosages >700 mg/day Reduce Risk of dying from Heart Disease by 62% ²	62% Risk Reduction ²⁵	Signif-ically lower risk ²	2,000 mg	2,000 mg ¹⁰ (To prevent diarrhea) No real upper limit to Vitamin C.

Lifespan

As early as 1984 researchers knew that supplementation of drinking water with vitamin C increased the average life span of mice by as much as 20 percent.¹²

A study of 11,000 Americans over 10 years revealed that individuals with the highest level of vitamin C intake, only about 300 milligrams, suffered 35 percent fewer deaths than those with the lowest intake, about 50 milligrams a day. This amounts to about 6 added years of life to those who consume higher levels of vitamin C. **Since 300 mg of vitamin C is difficult to obtain from dietary sources alone, the primary group that exhibited increased life span were the vitamin C supplement users.**¹³ A person would have to consume five oranges a day to get 300 milligrams of vitamin C from their diet alone.

A study over a 12-16-year period showed that males with the highest blood serum levels of vitamin C experienced a 57 percent drop in their risk of dying from any cause compared to males with low circulating levels of vitamin C.¹⁴

Among men and women ages 45-79 years, just a 50 milligram increase in vitamin C consumption was able to reduce the relative all-cause mortality rate by 20 percent.¹⁵

Another study published in 2001 also confirms a 25-29 percent decreased all-cause mortality rate among adults with normal to high circulating levels of vitamin C.¹⁶

It is interesting to note that vitamin C acts as an agent in various models of anti-aging. Vitamin C would be a key antioxidant in the free radical theory of aging.¹⁷ Researchers have demonstrated that vitamin C slows down telomere shortening by 52-62 percent in a controlled experiment.¹⁸ Telomeres are the end caps of DNA that shorten with many generations and limit the number of replications of DNA.

<http://www.lewrockwell.com/orig/sardi9.html>

Researchers from the National Institute on Aging report that elderly people who **take vitamin C and E supplements have a 50 per cent lower risk of dying prematurely from disease** than do people who do not supplement(29).²

A Californian study concluded that people who consume more than 750 mg/day of vitamin C reduce their risk of dying prematurely by 60 per cent(30).²

Italian researchers have concluded that older people, especially the sick are exposed to a much higher level of oxidative stress than are younger people and that their low blood levels of vitamin C reflect this(31).²

Other researchers have found that people who suffer from asthma, arthritis, cancer, diabetes, and heart disease have much lower levels of vitamin C in their blood than do healthy people(8,32-34).²

Cancer

Vitamin C prevents the inhibition of gap-junction intercellular communication (GJIC) induced by hydrogen peroxide."

Gap junction intercellular communication is necessary for the maintenance of normal cell growth and differentiation, and when inhibited, is associated with cancer promotion. Hydrogen peroxide, which is known to promote tumor growth, inhibits GJIC by modification of a protein. The researchers pretreated rat liver epithelial cells with vitamin C and found that hydrogen peroxide was unable exert this inhibitory effect, while other antioxidants tested failed to prevent it. This suggests that vitamin C's mechanism of action in tumor inhibition is other than that of an a free radical scavenger, and that prevention of CJIC is more likely.²⁴

Numerous studies have shown that an adequate intake of vitamin C is effective in lowering the risk of developing cancers of the breast, cervix, colon, rectum, esophagus, larynx, lung, mouth, prostate, and stomach(7,11,12,14,16- 23,36).²

Daily supplementation with 500 mg of vitamin C for 10 years or more has been found to cut the risk of developing bladder cancer by 60 per cent(37).²

The spread of breast cancer (metastasis) is now believed to be predominantly due to free radical damage which can be controlled through intake of increased amounts of vitamin C(38).²

Supplementation with 3 g/day of vitamin C has been found to effectively prevent further polyp growth in colon cancer and a vitamin C intake of more than 157 mg/day has been found to reduce the risk of developing colon cancer by 50 per cent(19,39).²

Dr. Pauling believed that vitamin C combats cancer by promoting collagen synthesis and thereby preventing growing tumors from invading adjacent tissue(8). Many researchers now believe that vitamin C prevents cancer by deactivating free radicals before they can damage DNA and initiate tumor growth while others believe that vitamin C may sometimes act as a prooxidant helping the body's own free radical defense mechanism destroy tumors in their early stages(11-14,16,40). Whatever the mechanism, it is now clear that vitamin C is effective in preventing cancer, alleviating its symptoms, and in some cases, halting its progress.²

Heart Disease

“The genetic predispositions with the highest probability for early clinical manifestation require the highest amount of ascorbate supplementation in the diet to prevent CVD development. The amount of ascorbate for patients at high risk should be comparable to the amount of ascorbate our ancestors synthesized in their body before they lost this ability: between 10,000 and 20,000 milligrams per day.

Optimum ascorbate supplementation prevents the development of CVD independently of the individual predisposition or pathomechanism. Ascorbate reduces existing atherosclerotic deposits and thereby decreases the risk for myocardial infarction and stroke. Moreover, ascorbate can prevent blindness and organ failure in diabetic patients, thromboembolism in homocystinuric patients, and many other manifestations of CVD.

[CVD] is the direct consequence of the inability of man to synthesize ascorbate in combination with insufficient intake of ascorbate in the modern diet. Since ascorbate deficiency is the common cause of human CVD, ascorbate supplementation is the universal treatment for this disease. The available epidemiological and clinical evidence is reasonably convincing. Further clinical confirmation of this theory should lead to the abolition of CVD as a cause of human mortality for the present generation and future generations of mankind.”²⁶

Vitamin C lowers blood pressure and cholesterol levels, helps thin the blood and protect it against oxidation and works in close synergism with vitamin E(9,25,41-45). Vitamin C also helps prevent atherosclerosis by strengthening the artery walls through its participation in the synthesis of collagen, and by preventing the undesirable adhesion of white blood cells to damaged arteries(9,46,47). An adequate intake of the vitamin is highly protective against stroke and heart attack(28,48,49).²

A recent study shows that people who supplement with more than 700 mg/day of vitamin C have a 62 per cent lower risk of dying from heart disease than do people with a daily intake of 60 mg/day or less(49). Supplementation with 2 g/day of vitamin C has been found to reduce adhesion of monocytes (white blood cells) to the lining of blood vessels and thereby reduce the risk of atherosclerosis(46,47,50). Vitamin C supplementation (2 g/day) also effectively reverses the vasomotor dysfunction often found in patients with atherosclerosis(51). Some very recent research carried out in Japan has shown that restenosis (reclosing of opened arteries) after angioplasty can be significantly reduced by supplementing with ascorbic acid (500 mg/day)(52).²

Diabetes

The study included 21,831 healthy, nondiabetic participants in the European Prospective Investigation of Cancer-Norfolk study, which was created to examine the association between diet and cancer. Vitamin C levels were measured in plasma, and food frequency questionnaires were administered upon enrollment between 1993 and 1997. Over a twelve year follow-up period, 423 men and 312 women developed diabetes.

Analysis of the data revealed a strong protective effect of high vitamin C levels against diabetes. Participants in the top 20 percent of plasma vitamin C had a 62 percent lower adjusted risk of developing diabetes compared

with those in the lowest fifth. Fruit and vegetable intake also emerged as protective. Those whose intake was in the top fifth had a 22 percent lower diabetes risk than subjects whose intake was lowest.²⁵

Glaucoma

Supplementing with vitamin C has been found to significantly lower the risk of cataracts and glaucoma and some very recent work has shown that open angle glaucoma can be reversed by supplementing with large doses of vitamin C(53,54).²

Recommended Dosage

Kurzweil recommends a dosage of 2,000 mg per day. Stone⁵ and Pauling⁶ calculated, based on the diet of our primate cousins⁷ (similar to what our common descendants are likely to have consumed when the gene mutated), that the optimum daily requirement of vitamin C is around 2,300 milligrams for a human requiring 2,500 kcal a day. Given that some vitamin C is obtained in diet, 2,000 mg is a good supplemental dosage recommendation to get close to the optimal daily requirement.

The established RDA [90 mg/day for males, 75 mg/day for females] has been criticized by Pauling to be one that will prevent acute scurvy, and is not necessarily the dosage for optimal health.⁸

“Humans and great apes likely still require the same micronutrients in the diet—they just use different dietary strategies to obtain them. Though the bioavailability of micronutrients to wild primates is almost totally unstudied, a high intake of various micronutrients (e.g. vitamins C and E, provitamin A, calcium) appears to be the norm. The difference between the estimated intake of certain micronutrients by wild primates and humans is striking.”¹¹

Nobel prize winner Dr. Linus Pauling suggested humans supplement their diet continually through the day to mimic what the liver would make if the gene for the gulonolactone oxidase enzyme were still active. Dr. Pauling advocated supplementation with mineral ascorbates, the same alkaline form of vitamin C the liver produces in mammals, not ascorbic acid which can sometimes be irritating to the stomach and can even eat away tooth enamel.²¹

The better store brands of buffered vitamin C powder (mineral ascorbates) include bioflavonoids.¹⁹

If you want to get all your vitamin C from foods, consumption of the recommended 5 to 7 servings of fruits and vegetables a day is likely to provide 200-250 milligrams. A mouse makes about 275 milligrams of vitamin C per day per kilogram (2.2 lbs) of body weight. If a mouse weighed 154 pounds, about the weight of a human, this would amount to about 19,250 milligrams of vitamin C per day. A 160-pound goat produces about 13,000 milligrams per day, and more under stress. A dog or cat will produce about 40 milligrams of vitamin C per kilogram of body weight per day, or the equivalent of 2800 mgs per day if these animals were about the same size as humans. So using animals as a rule of thumb, humans may benefit from consumption of anywhere from 2,000-20,000 milligrams per day.¹⁹

“The amount absorbed is 80-90% of a 180mg dose, 75% of 1 gram, 50% of 1.5g, 26% of 6g and 16% of 12g, according to Hickey and Roberts. I've been reading their book, Ascorbate: The Science of Vitamin C, and it is truly outstanding. The RDA is woefully inadequate. I'm seriously considering upping my dosage again.”

<http://www.imminst.org/forum/index.php?showtopic=8796>

Food Sources⁹

Kakadu plum	3100	Parsley	130	Cloudberry	60	Cauliflower	40
Camu Camu	2800	Guava	100	Elderberry	60	Garlic	31
Rose hip	2000	Kiwifruit	90	Persimmon	60	Grapefruit	30
Acerola	1600	Broccoli	90	Papaya	60	Raspberry	30
Seabuckthorn	695	Loganberry	80	Strawberry	60	Tangerine	30
Jujube	500	Redcurrant	80	Orange	50	Passion fruit	30
Baobab	400	Brussels sprouts	80	Lemon	40	Spinach	30
Blackcurrant	200	Wolfberry (Goji)	73 †	Melon, cantaloupe	40	Cabbage raw green	30
Red pepper	190	Lychee	70	Cauliflower	40	Lime	30

Research Sources

The excerpts below come from <http://www.benbest.com/nutrceut/Selenium.html>
Each study is cited on an individual basis.

¹ ANTIOXIDANTS & REDOX SIGNALING; Mitsui,A; 4(2):693-696 (2002)

Transgenic mice which overexpress human thioredoxin have shown a 35% increase in median life span and a 22% increase in maximum lifespan

² http://www.vvv.com/healthnews/vitamin_C.htm

³ http://biotechdaily.com/?option=com_article&Itemid=294720007&cat=Therapeutics

⁴ http://en.wikipedia.org/wiki/Vitamin_C#Genetic_rationales_for_high_doses

⁵ Stone, Irwin (1972). The Healing Factor: Vitamin C Against Disease. Grosset and Dunlap. ISBN 0-448-11693-6.

⁶ Pauling, Linus (1970). "Evolution and the need for ascorbic acid". Proc Natl Acad Sci U S A 67 (4): 1643–8. doi:10.1073/pnas.67.4.1643. PMID 5275366. Retrieved on 2007-03-06.

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Vitamin D

Summary

Main Function: Regulates cells, systems, and organs throughout the body.

Heart Disease Prevention	Cancer Prevention	Helps Prevent Osteoporosis	Enhances Immune System	Recommended Dosage per Day	Tolerable Upper Limit
40% Risk Reduction ²	60% Risk Reduction ¹	Deficiency associated with greater risk of hip fractures ⁶	Potent Immune System modulator ⁷	2,000-4,000 IU ¹	10,000 IU ⁴

Heart Disease

In the study, men classified as deficient in vitamin D were about **2 1/2 times more likely to have a heart attack** than those with higher levels of the vitamin.

Those with low vitamin D, on top of just being at higher risk for heart attack in general, were at particularly high risk to have a fatal heart attack.²

In the current Harvard study, more than 18,000 men, free of heart disease, had their vitamin D levels followed over 10 years. During the 10-year period, 454 men had either a heart attack or fatal coronary event. Other factors involved in heart disease, such as high cholesterol, smoking and diabetes, were taken into consideration. Those with **the lowest levels of vitamin D at the beginning and end of the study had the highest risk of heart attack. Those with the highest levels of vitamin D had the lowest risk of heart attack and those with an intermediate level of vitamin D had an intermediate risk of heart attack.**³

Cancer

As for cancer, Sardi says in a new book that a major reason not to be so fearful about the disease is vitamin D. A key U.S. study in June found it provided a **60 percent reduction in cancers.**¹

Vitamin D emerged as a protective factor in a study of over 3,000 adults who underwent a colonoscopy to look for polyps or lesions in the colon. There was a significantly lower risk of advanced cancerous lesions among those with the highest vitamin D intake.⁵

Osteoporosis

“Adequate storage levels of vitamin D help keep bones strong and may help prevent osteoporosis in older adults, in those who have difficulty walking and exercising, in post-menopausal women, and in individuals on chronic steroid therapy.”³⁵

Vitamin D deficiency, which is often seen in post-menopausal women and older Americans, has been associated with greater incidence of hip fractures.³⁹⁻⁴¹ In a review of women with osteoporosis hospitalized for hip fractures, 50 percent were found to have signs of vitamin D deficiency.³⁵ Daily supplementation with 800 IU of vitamin D may reduce the risk of osteoporotic fractures in elderly.”⁶

Enhancement of Immune System

Active vitamin D is a potent immune system modulator. There is plenty of scientific evidence that vitamin D has several different effects on immune system function that may enhance your immunity and inhibit the development of autoimmunity.⁷

How it Works

Scientists found that list is so long because vitamin D actually regulates cells, systems, and organs throughout the body.¹

Recommended Dosage

Experts suggest the best daily intake is at least 2,000 units for most kids and 4,000 for most adults. Yet the government recommends only 200 to 600 units depending a person's age. **Kurzweil recommends a dosage of 2,000 mg per day.**¹

Food Sources

Foods naturally rich in vitamin D are scarce. Seafood options top the list -- cod liver oil, salmon, mackerel and tuna. (Bonus: they also contain heart-healthy omega-3 fatty acids). Supplements are a reliable -- and safe -- source of vitamin D.⁴

Research Sources

¹ <http://www.cbn.com/cbnnews/269033.aspx>

Medical writer Bill Sardi says that if vitamin D were a drug, its benefits would make it the most popular ever "because we're talking about diabetes and hypertension and bone diseases, osteoporosis, and arteriosclerosis and cancer and autoimmune disease and the list goes on."

Scientists found that list is so long because vitamin D actually regulates cells, systems, and organs throughout the body"

As for cancer, Sardi says in a new book that a major reason not to be so fearful about the disease is vitamin D. A key U.S. study in June found it provided a 60 percent reduction in cancers.

"The Canadian Cancer Society immediately told all their citizens to begin supplementing with at least 1,000 units of vitamin D. The American Cancer Society? Mum's the word," Sardi said.

Experts suggest the best daily intake is at least 2,000 units for most kids and 4,000 for most adults. Yet the government recommends only 200 to 600 units depending a person's age.

"This whole thing when you think about it is patently absurd. And the government has been recommending this for ten years. They refuse to change, they refuse to even look at the science," Cannell said.

² <http://www.reuters.com/article/latestCrisis/idUSN09472209>

"Men with low levels of vitamin D have an elevated risk for a heart attack, researchers said on Monday in the latest study to identify important possible health benefits from the "sunshine vitamin."

In the study, men classified as deficient in vitamin D were about 2 1/2 times more likely to have a heart attack than those with higher levels of the vitamin.

"Those with low vitamin D, on top of just being at higher risk for heart attack in general, were at particularly high risk to have a fatal heart attack,"

A number of recent studies have indicated vitamin D also may offer a variety of other health benefits, including protecting against types of cancer including colon and breast cancer, peripheral artery disease and tuberculosis.

In January, researchers led by Dr. Thomas Wang of Harvard Medical School reported findings that fit with the new study, showing that people with low vitamin D levels have a higher risk for heart attack, heart failure and stroke.

Giovannucci said there is enough evidence about the value of vitamin D to encourage people to ensure they have normal levels. He said people can learn their vitamin D levels by having their doctor give them a blood test. Those whose levels are too low can take vitamin D supplements, he said.

"Many people have low vitamin levels," Giovannucci said.

³ <http://www.dailyherald.com/story/?id=207355>

"Although heart disease is most commonly associated with high cholesterol, being overweight, inactivity and stress, low levels of vitamin D are also strongly associated with the development of heart disease. It has been hypothesized that cardiovascular disease might be related to sun exposure and, ultimately, vitamin D levels. Several studies have demonstrated that low levels of vitamin D strongly correlated with heart attacks and that these heart attacks were more common in the winter and in higher latitudes, when sun exposure is lower. The incidence of heart disease decreases with altitude, because of increased sun exposure.

"In the current Harvard study, more than 18,000 men, free of heart disease, had their vitamin D levels followed over 10 years. During the 10-year period, 454 men had either a heart attack or fatal coronary event. Other factors involved in heart disease, such as high cholesterol, smoking and diabetes, were taken into consideration. Those with the lowest levels of vitamin D at the beginning and end of the study had the highest risk of heart attack. Those with the highest levels of vitamin D had the lowest risk of heart attack and those with an intermediate level of vitamin D had an intermediate risk of heart attack."

"Low vitamin D levels are common in people who live in the northern latitudes - like Chicago. People of color have an increased risk of low vitamin D. In my own experience, about 70 percent of my patients have very low to undetectable levels of vitamin D when I first see them. "

"The results of the Harvard study demonstrated that simply increasing dietary vitamin D can significantly reduce the risk of developing heart disease. The recommended daily amount of 400 IU per day is woefully inadequate and most people need a lot more. The best dietary sources of vitamin D are herring and some fish oils. However, most people need to take vitamin D-containing supplements."

⁴ <http://www.cnn.com/2008/HEALTH/diet.fitness/05/20/cl.vitamin.d/>

"The Institute of Medicine, a group that uses scientific research to formulate public health policies, currently recommends an Adequate Intake, or AI, rather than a specific daily amount of vitamin D. The AI for vitamin D is 200 International Units for adults under age 50, 400 IU for those 51 to 70, and 600 IU for those age 71 and above. As new studies continue to showcase vitamin D's potential benefits, more scientists are calling for increased recommendations. Some suggest as much as 10,000 IU --currently the tolerable upper intake daily."
--Kurzweil recommends 2,000 IU

"Foods naturally rich in vitamin D are scarce. Seafood options top the list -- cod liver oil, salmon, mackerel and tuna. (Bonus: they also contain heart-healthy omega-3 fatty acids."

"Supplements are a reliable -- and safe -- source of vitamin D"

⁵ *Lieberman DA, Prindiville S, Weiss DG, Willett W. Risk factors for advanced colonic neoplasia and hyperplastic polyps in asymptomatic individuals. J Am Med Assoc 2003;290:2959-67.*

⁶ <http://www.algaecal.com/vitamin-d-benefits.html>

Vitamin E

Summary

Main Function: Fat soluble powerful antioxidant. Works synergistically with Vitamin C.

Heart Disease Prevention	Cancer Prevention	Alzheimer's Prevention	Recommended Dosage per Day	Tolerable Upper Limit
30-40% Risk Reduction ^{1a}	32% Risk Reduction of Prostate Cancer (2 nd most common cancer in men). 41% Reduction of Prostate Cancer deaths. ⁵	60% Risk Reduction ^{1b}	800 IU ¹	1,500 IU ³

Heart Disease

A study of approximately 90,000 nurses suggested that the incidence of heart disease was 30 to 40 percent lower among nurses with the highest intake of vitamin E from diet and supplements. Researchers found that the apparent benefit was mainly associated with intake of vitamin E from dietary supplements. High vitamin E intake from food was not associated with significant cardiac risk reduction.^{1a}

Cancer

After five to eight years of taking the supplements, the 14,564 men taking vitamin E alone or with beta carotene had 32 percent fewer cases of prostate cancer than the 14,569 not taking vitamin E. In addition, there were 41 percent fewer prostate cancer deaths among men taking vitamin E.⁵

Alzheimer's Disease

In another study, published in the Annals of Neurology, Johns Hopkins researchers showing that 400 IUs of vitamin E, taken in concert with 500 mg of vitamin C, reduced the risk of Alzheimer's by 60 percent.^{1d}

How it Works

Vitamin E protects the body from various toxins such as mercury, lead, ozone, and nitrous oxide.^{4a} It supports a healthy circulatory system and assists in maintaining normal cholesterol levels.^{4b} The vitamin also assists in maintaining healthy immune system function.^{4c} Vitamin E is a powerful antioxidant. Some scientific evidence suggests that consumption of antioxidant vitamins may reduce the risk of certain forms of cancer.^{4d}

Recommended Dosage

Kurzweil recommends a dosage of 400-800 I.U. per day. When taking Vitamin E, you should take a product that contains all eight forms. **Do not take alpha-tocopherol by itself!** (this is all that is in most Vitamin E supplements --- *alpha-tocopherol alone is **not** Vitamin E.*) Some reliably made products include:

- Isomer E by GNC (*General Nutrition Center*)
- Vitamin E 400 with Tocotrienols by *Vitamin World*
- High Gamma Tocopherol Softgels by *Vitamin World*
- High Gamma Vitamin E Complete With Mixed Tocopherols Softgels by *Nature's Bounty*
- Walgreen's Finest Natural Vitamin E with D-Gamma 400 IU Complex USP Softgels by *Walgreen's*..¹

Food Sources

Almonds, Asparagus, Avocado, Nuts, Peanuts, Olives, Red Palm Oil, Seeds, Spinach and other green leafy vegetables, Vegetable oils (canola, corn, sunflower, soybean, cottonseed), Wheat germ.²

Research Sources

¹ <http://www.drpez.com/files/Download/Vitamin%20E.pdf>

(Contains references to the following:

- (a) Stampfer MJ, Hennekens CH, Manson JE, Colditz GA, Rosner B, Willett WC. Vitamin E consumption and the risk of coronary disease in women. *N Engl J Med* 1993;328:1444-9.
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- (c) Bostick RM, Potter JD, McKenzie DR, Sellers TA, Kushi LH, Steinmetz KA, Folsom AR. Reduced risk of colon cancer with high intakes of vitamin E: The Iowa Women's Health Study. *Cancer Res* 1993; 15:4230-17.)
- (d) Zandi, P. *Archives of Neurology*, January 2004; vol 61: pp 82

(a) A study of approximately 90,000 nurses suggested that the incidence of heart disease was 30 to 40 percent lower among nurses with the highest intake of vitamin E from diet and supplements. Researchers found that the apparent benefit was mainly associated with intake of vitamin E from dietary supplements. High vitamin E intake from food was not associated with significant cardiac risk reduction.

(d) 400 IUs of vitamin E, taken in concert with 500 mg of vitamin C, reduced the risk of Alzheimer's by 60 percent.

² http://en.wikipedia.org/wiki/Vitamin_E

³ http://www.mayoclinic.com/health/medical/NS_patient-vitamine

⁴ <http://www.rayandterry.com/itemdesc.asp?ic=VITE>

(Contains references to the following:

- (a) Pryor, WA. 1991. "Can vitamin E protect humans against the pathological effects of ozone in smog?" *Am J Clin Nutr.* 53(3):702-722.
- (b) *Pharmacol Res.* 1999 Sep;40(3):227-38.
- (c) *JAMA* (1997 May 7) 277(17):1380-6.
- (d) *Am J Clin Nutr.* 1991; 53:386S-390S.)

⁵ <http://www.cnn.com/HEALTH/9803/17/vitamin.e.prostate/>

Daily doses of Vitamin E reduced prostate cancer risk by a third and the disease's death rate by 41 percent in a study of thousands of smokers.

"This study for the first time really gives us that ray of hope that with something simple like a vitamin supplement, in this case a vitamin E supplement at a relatively modest dosage, that we can actually intervene, can actually hope to prevent prostate cancer," said study co-author Dr. Demetrius Albanes.

Prostate cancer is the second most common form of cancer in men behind skin cancer. It affects almost 80 percent of men over age 65, although many of them carry the disease undetected.

Those undetected, or latent, cancers are sometimes discovered incidentally or at autopsy. But latent tumors can become more serious, and that is where vitamin E proved to be a factor.

"We blocked the progression from those small latent, subclinical tumors to a full-blown, clinically detected and problematic prostate cancer," Albanes said.

The Finnish study involved 29,133 male smokers between age 50 and 69 who were selected to take part in a lung cancer study evaluating the effects of beta carotene and vitamin E on smokers. The men were divided into four groups: One group took beta carotene supplements; another took vitamin E; a third took a combination of the two; and the last group took a placebo.

The vitamin E dosage was 50 milligrams a day -- about five times the recommended minimum daily intake for men and 2 1/2 times what most people get from food, Albanes said.

After five to eight years of taking the supplements, the 14,564 men taking vitamin E alone or with beta carotene had 32 percent fewer cases of prostate cancer than the 14,569 not taking vitamin E.

In addition, there were 41 percent fewer prostate cancer deaths among men taking vitamin E.

Selenium

Summary

Main Function: Selenium is incorporated into proteins to make selenoproteins, which are important antioxidant enzymes. The antioxidant properties of selenoproteins help prevent cellular damage from free radicals. Other selenoproteins help regulate thyroid function and play a role in the immune system, DNA repair, and the detoxification of heavy metals.

Lifespan	Cancer Prevention	Immunity	Osteo-Arthritis	Protection against heavy metals	Recommended Dosage per Day	Tolerable Upper Limit
35% Increase in median life span ¹ 22% Increase in maximum lifespan Risk Reduction ¹	50% Overall Risk Reduction ² 63% Risk Reduction of Prostate Cancer (2 nd most common cancer in men) ² 58% Reduction of Colon Cancer ² 48% Reduction of Lung Cancer ²	20 times lower chance of dying from HIV-related causes if you have AIDS ³ 118% increase in lymphocyte cytotoxicity ⁴ 82% increase in natural killer cell activity ⁴	Selenium <i>deficiency</i> can contribute to osteo-arthritis ⁵	Selenium protects against toxic metals such as mercury ⁶ and arsenic ⁷	200 mcg ⁸	400 mcg ⁹

Interesting note: Supplementing with 200 mcg of Selenium costs 1.62 per month [Buy From Amazon.com](#)

Lifespan

Transgenic mice which overexpress human thioredoxin have shown a 35% increase in median life span and a 22% increase in maximum lifespan.¹

Cancer

The study reported a 50% decrease in total cancer incidence as well as a 63% reduction in prostate cancer, a 58% reduction in colorectal cancer and a 48% reduction in lung cancer. Only 6 of the 1,312 subjects had selenium blood levels below that achievable by the RDA prior to supplementation.²

Immunity

AIDS patients who are selenium-deficient are nearly 20 times more likely to die from HIV-related causes as patients with adequate selenium.³

Humans supplemented with 200µg/day of selenium for 8 weeks showed a 118% increase in lymphocyte cytotoxicity and an 82.3% increase in natural killer cell activity.⁴

Osteoarthritis

Selenium *deficiency* can contribute to osteo-arthritis.⁵

Protection Against Heavy Metals

Selenium protects against toxic metals such as mercury⁶ and arsenic.⁷

Additional Cancer Information

A preponderance of evidence indicates that high-dose selenium supplementation reduces the incidence of cancer in animals. Of more than 100 published studies on more than 20 animal models of cancer (including spontaneous and virally and chemically induced cancers), more than two thirds found evidence of significant reductions in tumor incidence with selenium supplementation. Furthermore, it appears that methylated forms of selenium—which are produced in the highest amounts in the body when there is excess selenium intake—are the active compounds offering cancer chemoprevention.¹¹

Alzheimers

Studies have found a significant association between low selenium levels and rapid cognitive decline in the elderly.^{12,13} When the brains of Alzheimer's patients were examined for selenium status, they contained only 60% as much of this essential nutrient as the brains of control patients.¹²

Mood

Since the brain is deficient in an enzyme responsible for removing damaging peroxidation products such as hydrogen peroxide, selenium-based antioxidant proteins must shoulder the job alone.¹⁴ Many studies show that when selenium status is marginal, supplementation improves mood. Three separate studies have correlated low selenium status with a greater incidence of depression, anxiety, hostility, or confusion.^{12, 15-17}

How it Works

Selenium is a trace element nutrient which functions as cofactor for reduction of antioxidant enzymes such as glutathione peroxidases and certain forms of thioredoxin reductase found in animals and some plants.¹⁰

Recommended Dosage

Kurzweil recommends a dosage of 200 mcg per day. Do *not* take more than 400 mcg (the tolerable upper limit) per day as high doses of Selenium can be harmful. High doses of vitamin C (over one gram) may reduce the absorption of selenium. **This mineral is best taken one hour before or 20 minutes after taking vitamin C supplements.** *Am J Clin Nutr.* 1989 May;49(5):862-9.

Food Sources

Almonds, Asparagus, Avocado, Nuts, Peanuts, Olives, Red Palm Oil, Seeds, Spinach and other green leafy vegetables, Vegetable oils (canola, corn, sunflower, soybean, cottonseed), Wheat germ.⁹

Research Sources

The excerpts below come from <http://www.benbest.com/nutrceut/Selenium.html>
Each study is cited on an individual basis.

¹ ANTIOXIDANTS & REDOX SIGNALING; Mitsui,A; 4(2):693-696 (2002)

Transgenic mice which overexpress human thioredoxin have shown a 35% increase in median life span and a 22% increase in maximum lifespan

² JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION; Clark,LC; 276(24):1957-1963 (1996)

In 1996 the JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION published the results of a multi-center, double-blind, randomized, placebo-controlled cancer prevention trial based on 200µg/day selenium or placebo to 1,312 patients over a mean period of 4.5 years [JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION; Clark,LC; 276(24):1957-1963 (1996)]. The study reported a 50% decrease in total cancer incidence as well as a 63% reduction in prostate cancer, a 58% reduction in colorectal cancer and a 48% reduction in lung cancer. Only 6 of the 1,312 subjects had selenium blood levels below that achievable by the RDA prior to supplementation. Not only was this study a powerful refutation of the claim that dietary supplements are of no benefit, but its results were so impactful that it would be unethical for anyone to repeat it.

Selenium has so many anti-cancer actions that it is difficult to establish which ones are predominant. Selenium affects oxidative stress, DNA methylation, DNA repair, inflammation, apoptosis, cell proliferation, carcinogen metabolism, hormone production, angiogenesis and immune function [JNCI, JOURNAL OF THE NATIONAL CANCER INSTITUTE; Taylor,PR; 96(6):645-647 (2004)].

Cancer begins with DNA mutation, aberrant DNA methylation or defective cell-cycle control. DNA is normally protected from cancer-causing substances by methyl groups, but selenium deficiency (like folic acid deficiency) can result in decreased DNA methylation and therefore increased DNA damage and mutation [THE JOURNAL OF NUTRITION; Davis,CD; 133(9):2907-2907 (2003) and THE JOURNAL OF NUTRITION; Davis,CD; 130(12):2903-2909 (2000)]. Selenium also promote the activity of p53 protein, which is often called "the guardian of the genome". Well over half of all cancers have defective p53 protein. When DNA is damaged, p53 either stimulates DNA repair or causes cells to self-destruct (apoptosis) if the DNA damage is irreparable. The thioredoxin reductase system promotes p53 induction of DNA repair enzymes [PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES (USA); Seo,YR; 99(22):14548-14553 (2002)]. Cells exposed to selenomethionine have shown a 3-fold increase in p53 activity [JNCI, JOURNAL OF THE NATIONAL CANCER INSTITUTE; Longtin,R; 95(2):98-100 (2003)].

³ JOURNAL OF ACQUIRED IMMUNE DEFICIENCY SYNDROMES AND HUMAN RETROVIROLOGY; 15(5):370-374 (1997)

AIDS patients who are selenium-deficient are nearly 20 times more likely to die from HIV-related causes as patients with adequate selenium

⁴ BIOLOGICAL TRACE ELEMENT RESEARCH; Kiremidjian-Schumacher,L; 41(1-2):115-127 (1994)

Humans supplemented with 200µg/day of selenium for 8 weeks showed a 118% increase in lymphocyte cytotoxicity and an 82.3% increase in natural killer cell activity.

⁵ OSTEOARTHRITIS AND CARTILAGE; Kurz,B; 10(2):119-126 (2002)

Selenium deficiency can contribute to osteoarthritis.

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- ⁶ BIOCHEMICAL AND BIOPHYSICAL RESEARCH COMMUNICATIONS; Yoneda,S; 231(1):7-11 (1997)
⁷ JOURNAL OF INORGANIC BIOCHEMISTRY; Zeng,H; 99(6):1269-1274 (2005)

Selenium protects against toxic metals such as mercury⁶ and arsenic.⁷

⁸ <http://www.benbest.com/nutrceut/Selenium.html>

⁹ <http://www.feinberg.northwestern.edu/nutrition/factsheets/selenium.html>

¹⁰ <http://en.wikipedia.org/wiki/Selenium>

¹¹ Rayman MP, Clark LC. Selenium in cancer prevention. In Roussel AM, ed. Trace Elements in Man and Animals. 10th ed. New York: Plenum Press;2000:575-580.

¹² Hawkes WC, Hornbostel L. Effects of dietary selenium on mood in healthy men living in a metabolic research unit. Biol Psychiatr. 1996 Jan 15;39(2):121-8.

¹³ Berr C, Balansard B, Arnaud J, Roussel AM, Aplerovitch A. Cognitive decline is associated with systemic oxidative stress – the EVA study. J Am Ger. Soc. 2000 Oct;48(10):1285- 91.

¹⁴ Halliwell B, Gutteridge JMC. Free Radicals in Biology and Medicine. 3rd ed. Oxford University Press;1999:135:729.

¹⁵ Benton D, Cook R. The impact of selenium supplementation on mood. Biol Psychiatry. 1991 Jun 1;29(11):1092-8.

¹⁶ Finley JW, Penland JG. Adequacy or deprivation of dietary selenium in healthy men: clinical and psychological findings. J Trace Elem Exp Med. 1998;11:11-27.

¹⁷ Benton D. Selenium intake, mood and other aspects of psychological functioning. Nutr Neurosci. 2002 Dec;5(6):363-74.

Calcium

Summary

Main Function: "Calcium is the most plentiful mineral in the body. It is essential in the formation of bones and teeth and important in preventing osteoporosis. It also plays a role in blood clotting, nerve transmission and in muscle contraction.^{1,2} Calcium appears to help maintain normal blood pressure levels."³

Blood Pressure	Colon Cancer	Premenstrual Moods	Weight Loss	Maintain Healthy Teeth and Bones	Recommended Dosage per Day	Tolerable Upper Limit
5.5 point reduction of systolic blood pressure ⁶ 3 point reduction of diastolic blood pressure ⁶	30% Risk Reduction (if taken as a supplement as opposed to through food) ⁵	Experience significantly fewer symptoms ⁶	High calcium intake suppresses hormones that stimulate the production of fat and inhibit its breakdown ⁶	Bones gradually surrender calcium for needs elsewhere in your body if you're not consuming enough. ⁶	Age 19-50: 1,000 mg ⁶ Adults over age 50: 1,200 mg ⁶	2500 mg ⁷

Colon Cancer

"McCullough and her colleagues studied more than 60,000 men and more than 66,000 women who were already participating in an ACS study of nutrition and cancer prevention. The participants were all between 50 and 74-years old when they enrolled in the study in 1992 and 1993. They were asked about their diet and supplement intake at the time they enrolled. The researchers used these questionnaires to estimate different nutrient intakes, including calcium and vitamin D.

By 1997, 421 men and 262 women in the group had developed colorectal cancer.

Benefits From Supplements, Not Food

The researchers found that people who got calcium primarily from food did not have a lower risk of colon cancer. However, people who got calcium primarily from supplements did.

People who took calcium supplements had about a 30% lower risk of developing colon cancer than people who did not take supplements.

The results of this study are consistent with previous research, which showed that taking calcium could help prevent the recurrence of colon polyps, a precursor to colon cancer."⁵

Blood Pressure

"The benefits of calcium on heart health were confirmed in the Dietary Approaches to Stop Hypertension (DASH) study, published in the New England Journal of Medicine in 1997. The study found that a healthy diet that included two to three servings a day of low-fat, calcium-rich dairy foods like yogurt reduced systolic blood pressure by 5.5 points more than the control diet, and reduced diastolic blood pressure by 3 points more. "We don't want to oversell the importance of calcium [for heart health], because it's only a part of the puzzle," says Heaney. "But it's a very useful part."⁶

Premenstrual Moods

“A 1998 study led by Susan Thys-Jacobs, M.D., of St. Luke's Roosevelt Hospital in New York City, found that getting enough calcium can ease the symptoms of premenstrual syndrome (PMS). In this study of 497 women, published in the American Journal of Obstetrics and Gynecology, half took 600 mg supplements of calcium carbonate twice a day, while half took a placebo. The women who took calcium experienced significantly fewer symptoms in two months and improved even more after three months.

The explanation comes down (again) to calcium-regulating hormones. Your body suppresses the hormones if your calcium supplies are adequate, but releases these hormones if you're not getting enough. Women who suffer from PMS appear to have elevated levels of these hormones during their menstrual cycle. Thys-Jacobs explains that it's no accident that some of the symptoms of PMS, like cramping, irritability, and depression, are similar to the symptoms of a calcium-deficient state.

The good news for PMS sufferers is that consuming calcium appears to ease most of the symptoms. "We found that calcium is effective both on the emotional and physical side," Thys-Jacobs says. "It has a major effect on irritability, cravings, mood swings, breast tenderness, and other symptoms."”⁶

Weight Loss

“Research suggests that if you don't get enough calcium in your diet, you're likely to be overweight, Heaney says. Of course, it's possible to be overweight even if you do get plenty of calcium, but Heaney points out that an adequate supply appears to make it easier to maintain a healthy weight.

The reason has to do with your body's response to a calcium deficit. When you're low, your body thinks you're starving and enters emergency mode, releasing parathyroid hormone from four glands in your neck. This hormone stimulates your bones to release some calcium into your bloodstream. Your kidneys also deliver a dose of a hormone called calcitriol, a form of vitamin D, to increase your ability to absorb calcium.

The trouble is that parathyroid hormone and calcitriol also stimulate the production of fat and inhibit its breakdown. As a result, your body stores fat and holds on to it stubbornly, even if you're on a low-calorie diet, explains Michael B. Zemel, Ph.D., head of the department of nutrition at the University of Tennessee at Knoxville. On the other hand, a high calcium intake suppresses these hormones so your body stores less fat and also breaks it down easily, he says.”⁶

Maintain Healthy Teeth and Bones

“Calcium protects your teeth in an indirect way. Your teeth themselves are relatively inert, meaning that the calcium they contain usually stays there.

Your jawbone is the potential problem. Like other bones, it gradually surrenders calcium for needs elsewhere in your body if you're not consuming enough. As your jaw weakens, your teeth loosen, creating gaps where bacteria can invade, triggering infection, inflammation, and bleeding. In fact, the condition of your teeth and gums can be a window to the overall health of your bones, says Bonnie Bruce, R.D., D.P.H., M.P.H., a registered dietitian and a research director in immunology and rheumatology at Stanford University in Stanford, Calif.”⁶

Recommended Dosage

“Most people don't consume adequate amounts of dietary calcium.¹ The Daily Recommended Intake (DRI) of calcium for adults aged 19 - 50 is 1,000 mg. For adults over age 50, the recommendation is 1,200 mg daily.

Vitamin D is needed for calcium absorption, so 400 IU of vitamin D should be consumed daily as well. Calcium is found in dairy products, green leafy vegetables such as broccoli and kale and fortified fruit juice.”⁴

Food Sources

“Excellent sources of calcium include spinach, turnip greens, mustard greens and collard greens.

Very good sources of calcium include blackstrap molasses, Swiss chard, yogurt, kale, mozzarella cheese, cow's milk, and goat's milk. Basil, thyme, dill seed, cinnamon, and peppermint leaves are also very good sources of calcium.

Good sources of calcium include romaine lettuce, celery, broccoli, sesame seeds, fennel, cabbage, summer squash, green beans, garlic, tofu, Brussel sprouts, oranges, asparagus and crimini mushrooms. Oregano, rosemary, parsley, kombu, and kelp are also good sources of calcium.”⁸

Research Sources

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Magnesium

Summary

Main Function: “Magnesium is the fourth most abundant mineral in the body and is essential to good health. Approximately 50% of total body magnesium is found in bone. The other half is found predominantly inside cells of body tissues and organs. Only 1% of magnesium is found in blood, but the body works very hard to keep blood levels of magnesium constant.

Magnesium is needed for more than 300 biochemical reactions in the body. It helps maintain normal muscle and nerve function, keeps heart rhythm steady, supports a healthy immune system, and keeps bones strong. Magnesium also helps regulate blood sugar levels, promotes normal blood pressure, and is known to be involved in energy metabolism and protein synthesis. There is an increased interest in the role of magnesium in preventing and managing disorders such as hypertension, cardiovascular disease, and diabetes. Dietary magnesium is absorbed in the small intestines. Magnesium is excreted through the kidneys.”

Blood Pressure	Diabetes	Heart Disease & Stroke	Bone formation	Nerve and Muscle Relaxation	Recommended Dosage per Day	Tolerable Upper Limit
2.7 point drop in systolic ⁵ 1.5 point drop in diastolic ⁵	Magnesium influences the release and activity of insulin ¹	Lowers the risk of heart disease. ¹ Lowers the risk of stroke. ¹	Gives bones physical structure ²	Keeps nerves relaxed which prevents muscles from over-contraction ²	500 mg	350 mg ¹ (dosages from 1,000-5,000 mg have been shown to cause diarrhea)

Blood Pressure

An observational study examined the effect of various nutritional factors on incidence of high blood pressure in over 30,000 US male health professionals. After four years of follow-up, it was found that a lower risk of hypertension was associated with dietary patterns that provided more magnesium, potassium, and dietary fiber [37]. For 6 years, the Atherosclerosis Risk in Communities (ARIC) Study followed approximately 8,000 men and women who were initially free of hypertension. In this study, the risk of developing hypertension decreased as dietary magnesium intake increased.³

After examining individuals following eight weeks on magnesium and eight weeks off, Yuhei Kawano, M.D., and researchers at the National Cardiovascular Center in Osaka, Japan, determined that, "blood pressures were significantly lower during the magnesium supplementation period, although the differences were small." Changes in blood pressure averaged about 2.7 millimeters of mercury (mm/Hg) less in systolic (top number) pressure and 1.5 mm/Hg less in diastolic (bottom number) pressure while participants were taking magnesium.

Kawano and his colleagues say the effect of magnesium on lowering blood pressure was greater for people with higher blood pressure.⁵

Diabetes

“Magnesium plays an important role in carbohydrate metabolism. It may influence the release and activity of insulin, the hormone that helps control blood glucose (sugar) levels [13]. Low blood levels of magnesium (hypomagnesemia) are frequently seen in individuals with type 2 diabetes. Hypomagnesemia may worsen insulin resistance, a condition that often precedes diabetes, or may be a consequence of insulin resistance. Individuals with insulin resistance do not use insulin efficiently and require greater amounts of insulin to maintain blood sugar within normal levels. The kidneys possibly lose their ability to retain magnesium during periods of severe hyperglycemia (significantly elevated blood glucose). The increased loss of magnesium in urine may then result in lower blood levels of magnesium [4]. In older adults, correcting magnesium depletion may improve insulin response and action [42].

The Nurses' Health Study (NHS) and the Health Professionals' Follow-up Study (HFS) follow more than 170,000 health professionals through biennial questionnaires. Diet was first evaluated in 1980 in the NHS and in 1986 in the HFS, and dietary assessments have been completed every 2 to 4 years since. Information on the use of dietary supplements, including multivitamins, is also collected. As part of these studies, over 127,000 research subjects (85,060 women and 42,872 men) with no history of diabetes, cardiovascular disease, or cancer at baseline were followed to examine risk factors for developing type 2 diabetes. Women were followed for 18 years; men were followed for 12 years. Over time, the risk for developing type 2 diabetes was greater in men and women with a lower magnesium intake.”¹

Heart Disease

“Some observational surveys have associated higher blood levels of magnesium with lower risk of coronary heart disease [50-51]. In addition, some dietary surveys have suggested that a higher magnesium intake may reduce the risk of having a stroke [52]. There is also evidence that low body stores of magnesium increase the risk of abnormal heart rhythms, which may increase the risk of complications after a heart attack [4]. These studies suggest that consuming recommended amounts of magnesium may be beneficial to the cardiovascular system. They have also prompted interest in clinical trials to determine the effect of magnesium supplements on cardiovascular disease.”¹

Bone Formation

About two thirds of all magnesium in our body is found in our bones. Researchers have discovered, however, that bone magnesium has two very different roles to play in our health. Some of the magnesium in our bones helps give them their physical structure. This magnesium is part of the bone's crystal lattice and is found in this "bone scaffolding" together with the minerals phosphorus and calcium.

Other amounts of magnesium, however, are found on the surface of the bone. This surface magnesium does not appear to be involved in the bone's structure, but instead acts as a storage site for magnesium which the body can draw upon in times of poor dietary supply.²

Nerve and Muscle Relaxation

“Magnesium and its fellow macronutrient, calcium, act together to help regulate the body's nerve and muscle tone. In many nerve cells, magnesium serves as a chemical gate blocker - as long as there is enough magnesium around, calcium can't rush into the nerve cell and activate the nerve. This gate blocking by magnesium helps keep the nerve relaxed. If our diet provides us with too little magnesium, this gate blocking can fail and the nerve cell can become overactivated. When some nerve cells are overactivated, they can send too many messages to the muscles and cause the muscles to overcontract. This chain of events helps explain how magnesium deficiency can trigger muscle tension, muscle soreness, muscle spasms, muscle cramps, and muscle fatigue.”²

Recommended Dosage

500 mg/ day, taken in divided doses. “An estimated 50% to 85% of the population of the United States is receiving an inadequate magnesium intake.”

Food Sources

“Excellent sources of magnesium include Swiss chard and spinach.

Very good sources of magnesium include mustard greens, summer squash, broccoli, blackstrap molasses, halibut, turnip greens, pumpkin seeds and peppermint.

There are numerous good sources of magnesium including cucumber, green beans, celery, kale and a variety of seeds, including sunflower seeds, sesame seeds, and flax seeds.”⁴

Research Sources

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Fish Oil: Omega-3 Essential Fatty Acids (EFA's)

Summary

Main Function: Omega 3's are intimately involved in the control of inflammation, cardiovascular health, myelin sheath development, allergic reactivity, immune response, hormone modulation, IQ, and behavior.⁶

Heart Disease	Stroke	Prostate Cancer	Regulation of Blood Sugar Levels	Reduction of Bad Fats in System	Other Benefits	Recom-mended Dosage per Day	Tolerable Upper Limit
49% Risk Reduction of Heart Disease Deaths ¹ 48% Reduction in death from Irregular Heartbeat ¹	50% Risk Reduction ⁵	6 times lower chance of dying from prostate cancer ²	The more you use, the more normal blood sugar becomes ³	25% Reduction of saturated fats, trans fats, and partially hydrogenated fats ³ 65% Reduction of triglycerides ³	Many other benefits, please read below under Other Benefits	EPA 1,000-3,000 DHA 700-2,000	None set ⁴

Heart Disease

The population-based prospective cohort study followed 3,910 adults over the course of 9.5 years. See id. at 5. Mozaffarian, et al. found that "there was a 49% lower risk of ischemic heart disease deaths and a 48% lower risk of arrhythmic deaths among persons consuming tuna/other fish three or more times per week compared to those consuming less than once per month."¹

Stroke

"Strong evidence from population-based clinical studies suggests that omega-3 fatty acid intake (primarily from fish) helps protect against stroke caused by plaque buildup and blood clots in the arteries that lead to the brain. In fact, eating at least 2 servings of fish per week can reduce the risk of stroke by as much as 50%."⁵

Cancer

The engineered mice were fed varying levels of fish-derived omega-3 and vegetable-derived omega-6 fatty acids from birth.

The team found that mice on a diet high in omega-3 fish oils had a 60 per cent survival rate from prostate cancer. But only ten per cent of those on a low omega-3 diet survived.

And mice given a diet with high omega-6 levels and very low omega-3 had the poorest survival rates.²

Regulation of Blood Sugar Levels

The more you use the more normal blood sugar becomes³

Reduction of Bad Fats in System

Getting the "acceptable daily fat intake" in your system will reduce the bad fats (saturated fats, trans-fatty acids or partially hydrogenated fats) by as much as 25% and triglycerides by up to 65%.³

Other Benefits

a. **Reduction of Inflammation**

“Diets that provide Omega 6 oils at the expense of omega 3 stimulate pro-inflammatory pathways in the body. While Omega 3’s on the other hand stimulates anti-inflammatory pathways. As a result Omega 6 has been coined as “bad” and Omega 3’s as “good”. In fact both are essential for human health and its balance of the two in relation to each other that is important. Dominant Omega 6 in the body can create a situation that promotes chronic inflammation, propagation of cancer, heart disease, stroke, diabetes, arthritis, and auto immunity. The body’s inflammatory response is intimately regulated by Omega 3’s. The inflammatory response was created to respond to acute injury or microbial attack. However, if the inflammatory response is needlessly provoked, damage to tissue and organs of the body occurs. The reduction of Omega 3 in the diet of the industrialized nations has created a situation of chronic inflammation in these people. In this case, the symptom of inflammation precedes the disease. However, as inflammation leads to disease a vicious circle of inflammation of disease is formed.”⁶

b. **Maintains *balance* between Omega-3 and Omega-6 (VERY IMPORTANT – PLEASE READ)**

“A deficiency of Omega 3 is positively correlated with over 50 diseases and illnesses including the dreaded diseases of Cancer, Heart Disease, Diabetes, Stroke, and Arthritis. The so-called western degenerative diseases have risen in a near perfect linear fashion with the elimination of Omega 3, and the over-provision of Omega 6 in the food chain. In many regards saturated fats may have been ruled guilty by association as the genesis of cardiovascular disease appears to be more closely related to a rise in vegetable oil ingestion than it does to saturated fat. Perhaps it should come as no surprise that supplemental ingestion of Omega 3 greatly improves all of the 50 known Omega 3 deficiency conditions.

In a landmark study, Japanese researchers have discovered the leading cause of westernized degenerative diseases in Japan, if not in the world. Their work has gone far to confirm the landslide of emerging scientific research which is beginning to reveal that the genesis of degenerative diseases is owed to a drastic reduction in the ingestion of Omega 3 in relation to increased ingestion of Omega 6. Their findings came after an exhaustive review of over 500 peer-reviewed studies and after accounting for all known and suspected causes for degenerative illnesses. Perhaps having the most impact are the words of the Japanese researchers themselves excerpted from the study summary:

‘We summarize the evidence that increased dietary linoleic acid (Omega 6) and relative Omega 3 deficiencies are major risk factors for western type cancers cardiovascular and cerebrovascular diseases and also for allergic hyper-reactivity. We also raise the possibility that a relative Omega 3 deficiency may be affecting the behavioral patterns of a proportion of the young generation in the industrialized countries.’ It is proposed that dietary intervention with Omega 3 supplementation and the reduction of Omega 6 in the diet could successfully reverse rising trend toward westernized degenerative diseases in Japan, and the world. The dietary transition to a westernized diet in Japan occurring in the last fifty years and the subsequent rise in degenerative disease is merely a microcosm of the transition, which occurred in the United States beginning with the Industrial Revolution.

A modern dietary shift unprecedented in human history favoring the ingestion of Omega 6 at the expense of Omega 3 is being owed as a primary, if not the leading cause of westernized degenerative diseases. In light of this information it is highly advisable to make conscious dietary choices to reduce the amount of extraneous Omega 6 in the diet and to ingest Omega 3's in an effort to return the body to balance."⁶

c. **High Cholesterol**

"Those who follow a Mediterranean-style diet tend to have higher high density lipoprotein (HDL or "good")cholesterol levels. Similar to those who follow a Mediterranean diet, Inuit Eskimos, who consume high amounts of omega-3 fatty acids from fatty fish, also tend to have increased HDL cholesterol and decreased triglycerides (fatty material that circulates in the blood). In addition, fish oil supplements containing eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) have been reported in several large clinical studies to reduce low density lipoprotein (LDL or "bad") cholesterol and triglyceride levels. Finally, walnuts (which are rich in alpha linolenic acid or ALA) have been reported to lower total cholesterol and triglycerides in individuals with high cholesterol levels."⁵

d. **High Blood Pressure**

"Several clinical studies suggest that diets or supplements rich in omega-3 fatty acids lower blood pressure significantly in individuals with hypertension. An analysis of 17 clinical studies using fish oil supplements found that supplementation with 3 or more grams of fish oil daily can lead to significant reductions in blood pressure in individuals with untreated hypertension."⁵

e. **Diabetes**

"Individuals with diabetes tend to have high triglyceride and low HDL levels. Omega-3 fatty acids from fish oil can help lower triglycerides and apoproteins (markers of diabetes), and raise HDL, so people with diabetes may benefit from eating foods or taking supplements that contain DHA and EPA. ALA (from flaxseed, for example) may not have the same benefit as DHA and EPA because some people with diabetes lack the ability to efficiently convert ALA to a form of omega-3 fatty acids that the body can use readily. There have been slight increases reported in fasting blood sugar levels in patients with type 2 diabetes while taking fish oil supplements."⁵

f. **Weight Loss**

"Many individuals who are overweight suffer from poor blood sugar control, diabetes, and high cholesterol. Clinical studies suggest that overweight people who follow a weight loss program that includes exercise tend to achieve better control over their blood sugar and cholesterol levels when fish rich in omega-3 fatty acids (such as salmon, mackerel, and herring) is a staple in their low-fat diet."⁵

g. **Arthritis**

"Most clinical studies investigating the use of omega-3 fatty acid supplements for inflammatory joint conditions have focused almost entirely on rheumatoid arthritis. Several articles reviewing the research in this area conclude that omega-3 fatty acid supplements reduce tenderness in joints, decrease morning stiffness, and allow for a reduction in the amount of medication needed for people with rheumatoid arthritis.

In addition, laboratory studies suggest that diets rich in omega-3 fatty acids (and low in the inflammatory omega-6 fatty acids) may benefit people with other inflammatory disorders, such as osteoarthritis. In fact, several test tube studies of cartilage-containing cells have found that omega-3 fatty acids decrease inflammation and reduce the activity of enzymes that destroy cartilage. Similarly, New Zealand green lipped mussel (*Perna canaliculus*), another potential source of omega-3 fatty acids, has been reported to reduce joint stiffness and pain, increase grip strength, and enhance walking pace in a small group of people with osteoarthritis. In some participants, symptoms worsened before they improved.

An analysis was conducted of 17 randomized, controlled clinical trials assessing the pain relieving effects of omega-3 fatty acid supplementation in patients with rheumatoid arthritis or joint pain caused by inflammatory bowel disease (IBS) and painful menstruation (dysmenorrhea). The results suggest that omega-3 fatty acids are effective treatment, along with conventional therapies such as anti-inflammatory drugs, for joint pain associated with rheumatoid arthritis, inflammatory bowel disease, and dysmenorrhea.”⁵

h. **Osteoporosis**

“Clinical studies suggest that omega-3 fatty acids such as EPA help increase levels of calcium in the body, deposit calcium in the bones, and improve bone strength. In addition, studies also suggest that people who are deficient in certain essential fatty acids (particularly EPA and gamma-linolenic acid [GLA], an omega-6 fatty acid) are more likely to suffer from bone loss than those with normal levels of these fatty acids. In a study of women over 65 with osteoporosis, those given EPA and GLA supplements experienced significantly less bone loss over 3 years than those who were given a placebo. Many of these women also experienced an increase in bone density.”⁵

i. **Depression**

“People who do not get enough omega-3 fatty acids or do not maintain a healthy balance of omega-3 to omega-6 fatty acids in their diet may be at an increased risk for depression. The omega-3 fatty acids are important components of nerve cell membranes. They help nerve cells communicate with each other, which is an essential step in maintaining good mental health. In particular, DHA is involved in a variety of nerve cell processes.

Levels of omega-3 fatty acids were found to be measurably low and the ratio of omega-6 to omega-3 fatty acids were particularly high in a clinical study of patients hospitalized for depression. In a clinical study of individuals with depression, those who ate a healthy diet consisting of fatty fish 2 - 3 times per week for 5 years experienced a significant reduction in feelings of depression and hostility.”⁵

j. **Inflammatory Bowel Syndrome (IBS)**

“When added to medication, such as sulfasalazine (a standard medication for IBD), omega-3 fatty acids may reduce symptoms of Crohn's disease and ulcerative colitis -- the 2 types of IBD. More studies to investigate this preliminary finding are under way.”⁵

k. **Asthma**

“Clinical research suggests that omega-3 fatty acid supplements (in the form of perilla seed oil, which is rich in ALA) may decrease inflammation and improve lung function in adults with asthma. Omega-6 fatty acids have the opposite effect: they tend to increase inflammation and worsen respiratory function. In a small, well-designed clinical study of 29 children with asthma, those who took fish oil supplements rich in EPA and DHA for 10 months had improvement in their symptoms compared to children who took a placebo pill.”⁵

l. **Macular Degeneration**

“A questionnaire administered to more than 3,000 people over the age of 49 found that those who consumed more fish in their diet were less likely to have macular degeneration (a serious age-related eye condition that can progress to blindness) than those who consumed less fish. Similarly, a clinical study comparing 350 people with macular degeneration to 500 without the eye disease found that those with a healthy dietary balance of omega-3 and omega-6 fatty acids and higher intake of fish in their diets were less likely to have this particular eye disorder. Another larger clinical study confirms that EPA and DHA from fish, 4 or more times per week, may reduce the risk of developing macular degeneration.”⁵

m. **Menstrual Pain**

“In a clinical study of nearly 200 Danish women, those with the highest dietary intake of omega-3 fatty acids had the mildest symptoms, such as hot flashes and increased sweating, during menstruation.”⁵

n. **Colon Cancer**

“Consuming significant amounts of foods rich in omega-3 fatty acids appears to reduce the risk of colorectal cancer. For example, Eskimos, who tend to follow a high-fat diet but eat significant amounts of fish rich in omega-3 fatty acids, have a low rate of colorectal cancer. Animal studies and laboratory studies have found that omega-3 fatty acids prevent worsening of colon cancer while omega-6 fatty acids promote the growth of colon tumors. Daily consumption of EPA and DHA also appeared to slow or even reverse the progression of colon cancer in people with early stages of the disease.

Clinical studies have reported that low levels of omega-3 fatty acids in the body are a marker for an increased risk of colon cancer.”⁵

o. **Breast Cancer**

“Although not all experts agree, women who regularly consume foods rich in omega-3 fatty acids over many years may be less likely to develop breast cancer. In addition, the risk of dying from breast cancer may be significantly less for those who eat large quantities of omega-3 from fish and brown kelp seaweed (common in Japan). This is particularly true among women who substitute fish for meat. The balance between omega-3 and omega-6 fatty acids appears to play an important role in the development and growth of breast cancer. Further research is still needed to understand the effect that omega-3 fatty acids may have on the prevention or treatment of breast cancer. For example, researchers speculate that omega-3 fatty acids in combination with other nutrients (namely, vitamin C, vitamin E, beta-carotene, selenium, and coenzyme Q10) may prove to be of particular value for preventing and treating breast cancer.”⁵

p. **Other**

“Although further research is needed, preliminary evidence suggests that omega-3 fatty acids may also prove helpful in protecting against certain infections and treating a variety of conditions, including autism, ulcers, migraine headaches, preterm labor, emphysema, psoriasis, glaucoma, Lyme disease, systemic lupus erythematosus (lupus), irregular heart beats (arrhythmias), multiple sclerosis, and panic attacks. Omega-3 fatty acid supplementation may also help to reduce stress and the effects it has on the body.”⁵

How it Works

“Throughout human history mankind has ingested an approximate equal proportion (1/1 ratio) of Omega 6 to Omega 3 fatty acids. The Omega 6 and 3 are two of the forty-nine known essential nutrients. As essential nutrients they cannot be synthesized by the body, but must be ingested directly in foods or in the form of dietary supplements. The relationship of equivalence between the two Omegas is critical because they self – check each other in a delicate balance to regulate thousands of metabolic functions through prostaglandin pathways. Nearly every biologic function is somehow interconnected with the delicate balance between Omega 6 and Omega 3. Omega 3’s are intimately involved in the control of inflammation, cardiovascular health, myelin sheath development, allergic reactivity, immune response, hormone modulation, IQ, and behavior. A seemingly minor, yet major change in Omega balance dictated by dietary ingestion has absolute deleterious health effects. The rapid change in dietary fat ingestion within only the last 50 - 100 years has bewildered human biophysiology created to function optimally on equal proportions of dietary omegas.”⁶

The modern western diet can be off by as much as 25:1 (25 times more omega-6 than omega-3).

Recommended Dosage

“An amazing 99% of people are deficient in EFA’s.”³ (99% of US Population does not meet the RDA requirement). The recommended dosage is EPA between 1,000-3,000 and DHA between 700-2,000.

Food Sources

Salmon, sardines, mackerel, herring, trout, flax seeds.³

Research Sources

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B-Vitamins

Summary

Main Function: “The B vitamins often work together to deliver a number of health benefits to the body. B vitamins have been shown to:

- * Support and increase the rate of metabolism
- * Maintain healthy skin and muscle tone
- * Enhance immune and nervous system function
- * Promote cell growth and division — including that of the red blood cells that help prevent anemia.
- * Reduce the risk of pancreatic cancer, one of the most lethal forms of cancer[3], when consumed in food, but not when ingested in vitamin tablet form.[4][5]

Together, they also help combat the symptoms and causes of stress, depression, and cardiovascular disease. All B vitamins are water soluble, and are dispersed throughout the body. Most of the B vitamins must be replenished daily, since any excess is excreted in the urine.[6] A six year cobalamin store can be found in the liver, despite its water soluble nature.”¹

“B1 (thiamine) – needed for release of energy from carbohydrates; aids in functioning of nervous system; helps maintain stomach acidity and normal appetite.

B2 (riboflavin) – needed for converting proteins, fats and carbohydrates into energy; necessary for healthy skin and eyes.

B3 (niacin) – needed for release of energy from food; maintains health of skin, mouth and digestive tract; necessary for normal mental function; can increase circulation and reduce high blood pressure.

B5 (pantothenic acid) – needed for release of energy from food; helps in the functioning of the adrenal gland and in the formation of antibodies.

B6 (pyridoxine) – needed for metabolism of protein, hence requirements related to protein intake; helps to maintain fluid balance, a requirement for healthy red blood cells.

B12 – needed for red blood cell production and maintenance of protective sheath around nerves.

Folic acid – Essential for growth and reproduction of cells, particularly red blood cells.

Biotin – involved in carbohydrate, protein and fat metabolism. Required for healthy skin and hair.”²

Energy Production	Healthy Nervous System (combats stress, anxiety, depression)	Good Digestion	Healthy Skin, Hair, and Nails	Synergy	Recommended Dosage per Day	Tolerable Upper Limit
Prevent “decreased energy production, lethargy and fatigue”	“A deficiency in any of the Vitamin B Complex vitamins can lead to feeling stressed, anxious and depressed.” ⁵	Prevents impaired digestion and therefore prevents deficiency of essential nutrients ⁵	Deficiencies in B vitamins can lead to issues with skin, hair, and nails ⁵	Deficiency in any one B Vitamin can lead to poor functioning of any or all of the others even if they are in good supply” ⁵	<i>B1 (Thiamine):</i> 100-200 mg <i>B2 (Riboflavin):</i> 50-100 mg <i>B3 (Niacin):</i> 200 mg <i>B6 (Pyridoxine):</i> 75-100 mg <i>Folic Acid:</i> 800 mcg <i>B12:</i> 1000 mcg ⁶	B Vitamins are Water-soluble so toxic reactions are extremely rare ⁷

Energy Production

Vitamin B1 is needed to help convert the carbohydrates we eat into glucose. The following B Vitamins are needed at a cellular level to convert glucose into energy - Vitamin B2, Vitamin B3, Vitamin B5, Vitamin B6 and Biotin. A Vitamin B deficiency in any of these vitamins can lead to decreased energy production, lethargy and fatigue.⁴

Healthy Nervous System

“The Vitamin B Complex is essential for the healthy functioning of the nervous system. Vitamin B5 is needed for the correct functioning of the adrenal glands and the production of some hormones and nerve regulating substances. Vitamin B1, Vitamin B6 and Vitamin B12 are essential for the regulation and correct functioning of the entire nervous system including brain function. Vitamin B9 is essential to prevent neural tube defects to the fetus during pregnancy. A deficiency in any of the Vitamin B Complex vitamins can lead to feeling stressed, anxious and depressed.”⁵

Good Digestion

“The Vitamin B Complex is essential for correct digestion, production of HCl (Hydrochloric acid) and to assist in the breakdown of fats, proteins and carbohydrates. Especially vital for good digestion are Vitamin B1, Vitamin B2, Vitamin B3 and Vitamin B6. A deficiency in any of these B Vitamins can lead to impaired digestion and deficiency of essential nutrients.”⁵

Healthy Skin, Hair, and Nails

“The Vitamin B Complex is essential for correct RNA and DNA synthesis and cell reproduction. As our Skin, Hair and Nails are constantly growing and renewing themselves we need the following B vitamins to ensure the good health of these structures - Vitamin B1, Vitamin B2, Vitamin B3, Vitamin B5, Vitamin B9, Vitamin B12, Biotin and Choline. Deficiencies of any of these B Vitamins can lead to dry, grey skin, dermatitis, wrinkles, acne, rashes, falling hair and weak, splitting nails.”⁵

Synergy

The B Vitamins work so closely with one other that a deficiency in any one B Vitamin can lead to poor functioning of any or all of the others even if they are in good supply. Always take the B Vitamins in a Complex and then top up with any individual Vitamin B, if needed.⁵

Recommended Dosage

“Thiamin (vitamin B1) (as thiamin HCl): 100 mg

Riboflavin (vitamin B2): 50 mg

Niacin (as niacinamide and niacin): 200 mg

Vitamin B6 (as pyridoxine HCl): 75 mg

Folic acid: 800 mcg

Vitamin B12 (as cyanocobalamin): 1000 mcg

Biotin: 600 mcg

Pantothenic acid (as D-calcium pantothenate): 1000 mg

Betaine free base (trimethylglycine): 50 mg

Choline (as choline bitartrate): 45 mg

Inositol: 250 mg

para-aminobenzoic acid (PABA): 100 mg”⁶

Tolerable Upper Limit

Because the B vitamins are water-soluble and eliminated in the urine, toxic reactions from oral administration of most of them are extremely rare.

Food Sources

“Yeast, yeast products, liver, red meat, chicken, other poultry, whole-grain cereals, egg yolks, fishes, legumes, milk and wheat germ.”³

Research Sources

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⁵ <http://www.healthandgoodness.com/nutritiondiet/vitamin-B-complex.html>

⁶ <http://www.lef.org/Vitamins-Supplements/Item00110/Complete-Vitamin-B-Complex.html>

⁷ http://www.umm.edu/patiented/articles/what_vitamins_000039_1.htm

Concluding Remarks

I hope this document has been very powerful in changing the way you think about supplements and their relation to health. As you can see from the chart on page 8, the cost of supplementing at the optimal dosages for the set of vitamins listed is \$21.77. Anyone should be able to afford this except for the extremely poor. We cannot put a price on our health and well-being. Supplementing consistently with the levels specified in the chart will *dramatically reduce risk for disease and slow down aging processes*. You will feel better, look better, think better, and most likely not die of any disease. In order to be consistent, I recommend buying 2 big pill separators (one for morning and one for night). I also recommend buying a smaller pill separator for afternoon pills (calcium/magnesium pills need to be taken morning/afternoon/night and selenium shouldn't be taken at the same time as Vitamin C because it decreases effectiveness). These pill separators can be purchased at Wegmans' pharmacy for about \$3 each). Organize your pills 1 day a week and get in the habit of taking them morning and night with plenty of water. Speaking of water,

“The findings of a six-year study of more than 20,000 healthy men and women aged 38-100 in the May 1, 2002 American Journal of Epidemiology found that women who drank more than five glasses of water a day were 41% less likely to die from a heart attack during the study period than those who drank less than two glasses. The protective effect of water was even greater in men.”

<http://completewellbeing.com/article/water-is-the-soul-of-health/>

Taking so many pills will require at least 5 total glasses of water between the morning and at night. Water helps to flush toxins out of the body and keeps cells hydrated.

If you read through this whole document, you should have the sense that literally all disease is due to insufficient daily intake of essential vitamins and nutrients. You do not have to be another statistic like the rest of America. *You do not have to suffer*. I have plenty of other non-supplement health recommendations for those who are interested. However, supplementation is a great place to start to receive a ton of health benefit for very little cost and for very little time/effort.

I wish you the best of luck and I sincerely hope that you will implement the recommendations for daily supplement intake. Through supplementation, you can prevent disease and slow aging before technology eradicates disease and aging completely in 15-20 years.

Blood Testing

“Everyone over age 40 should have their blood tested to make sure their homocysteine, fibrinogen, C-reactive protein, LDL-cholesterol, etc. are in the safe range.”

Testing your blood to avoid cardiovascular disease

Don't let complacent doctors put you at risk for heart disease and stroke. The following chart shows the most common blood tests that can help reveal underlying cardiovascular disease risk factors.

As can be seen on the chart below, blood test results that conventional doctors accept as being "normal" can be lethal to you. In other words, what the "Standard smalltext Range" allows is not always a practical indicator for where your "optimal" level should be.

In many cases, a "Standard smalltext Range" reflects what is expected to be seen in the average population. Since cardiovascular disease remains the number one killer of Americans, you don't ever want to be part of the "average" range when it comes to cardiovascular disease risk factors.

By keeping your blood levels in the "Optimal Range," rather than the average "Standard smalltext Range," you take advantage of the increasing volume of evidence showing that most heart attacks and strokes are preventable.

As you can see, the "Standard smalltext Range" often dangerously differs from what the published research indicates is protective against cardiovascular disease.

Blood Test	What The "Standard smalltext Range" Allows	The "Optimal" Level Where YOU Want To Be
Fibrinogen	Up to 460 mg/dL	Under 300 mg/dL
C-reactive protien	Up to 4.9 mg/L	Under 2 mg/L Some studies indicate C-reactive protien levels should be below 1.3 mg/L(23,24)
Homocysteine	Up to 15 micro mol/L	Under 7 micro mol/L
Glucose	Up to 109 mg/dL	Under 100 mg/dL
Iron	Up to 180 mg/dL	Under 100 mcg/dL
Cholesterol	Up to 199 mg/dL	Between 180-220 mg/dL
LDL cholesterol	Up to 129 mg/dL	Under 100 mg/dL
HDL cholesterol	No lower than 35 mg/dL	Over 50 mg/dL
Triglycerides	Up to 199 mg/dL	Under 100 mg/dL
DHEA	Males: No lower than 80 mcg/dL Females: No lower than 35 mcg/dL	Between 400-560 mcg/dL Between 350-430 mcg/dL

http://www.lef.org/magazine/mag2001/jan2001_aws.html

C-Reactive Protein (CRP) Blood Testing

“High levels of C-reactive protein indicate a potentially destructive inflammatory autoimmune condition that could predispose a person to a host of degenerative diseases. C-reactive protein can be suppressed by ibuprofen, aspirin or vitamin E.(12-15) Some of the pro-inflammatory immune cytokines that cause elevated C-reactive protein include interleukin-6, interleukin 1(b) and tumor necrosis factor alpha. Supplements such as DHEA,

vitamin K and nettle leaf extract can help suppress these dangerous inflammatory cytokines that can cause C-reactive protein elevation.(16-18)

As a marker for inflammation, the C-reactive protein test is gaining ground among mainstream medical experts as a much-needed addition to improve risk screening for cardiovascular disease. Since half of the people who have heart attacks do not have high cholesterol-triglyceride levels, a new report recommends the addition of C-reactive protein test in order to improve the ability to detect “absolute coronary risk”.(19)

One of the strengths of C-reactive protein testing is its ability to detect at-risk patients with normal cholesterol levels. The Physician's Health Study found that apparently healthy men with the highest C-reactive protein levels had twice the risk of future stroke, three times the risk of future heart attack, and four times the risk of future peripheral vascular disease.(20) The Women's Health Study reported that C-reactive protein was the single strongest predictor of future vascular risk.(21)”

http://search.lef.org/cgi-src-bin/MsmGo.exe?grab_id=0&page_id=394&query=bvitamins&hiword=BVITAMIN%20bvitamins

Extending Lives of People with Cancer (by a factor of 16)

“Drs. Pauling and Cameron pioneered the use of large doses of vitamin C (>10 g/day) in the treatment of cancer patients. From their experiments at the Vale of Leven Hospital in Scotland they concluded that terminal cancer patients who received large, daily doses of vitamin C along with their regular treatment lived much longer than patients who did not receive vitamin C; they also had less pain and in general, a much improved quality of life(8).

Dr. Hoffer of Victoria, Canada later expanded on the Pauling/Cameron treatment protocol by adding large amounts of vitamin E, niacin, other B vitamins, beta-carotene, and some minerals. Those of Dr. Hoffer's cancer patients who followed this regimen lived, on the average, about 16 times longer than those who did not(8).”

http://www.vvv.com/healthnews/vitamin_C.htm

Miscellaneous

BENEFITS OF VINPOCETINE (extremely useful for memory and optimal mental function)

[http://www.biogenesis-antiaging.com/Products-by-Function-Hearing-Disorders/c13_87/p316/Vinpocetine-\(Soll\)/product_info.html](http://www.biogenesis-antiaging.com/Products-by-Function-Hearing-Disorders/c13_87/p316/Vinpocetine-(Soll)/product_info.html)

BENEFITS OF OMEGA-3 ON THE BRAIN

http://www.lef.org/newsletter/2008/0715_Brain-Food.htm

Kurzweil's Supplement Regimen

"Kurzweil does not believe in half measures. He takes 180 to 210 vitamin and mineral supplements a day, so many that he doesn't have time to organize them all himself. So he's hired a pill wrangler, who takes them out of their bottles and sorts them into daily doses, which he carries everywhere in plastic bags. Kurzweil also spends one day a week at a medical clinic, receiving intravenous longevity treatments. The reason for his focus on optimal health should be obvious: If the singularity is going to render humans immortal by the middle of this century, it would be a shame to die in the interim. To perish of a heart attack just before the singularity occurred would not only be sad for all the ordinary reasons, it would also be tragically bad luck, like being the last soldier shot down on the Western Front moments before the armistice was proclaimed."

http://www.wired.com/medtech/drugs/magazine/16-04/ff_kurzweil?currentPage=all

"Significant chronic metabolic disruption may occur when consumption of a micronutrient is below the current recommended dietary allowance.

"Micronutrient inadequacies are widespread in the population, and a multivitamin-mineral (MVM) supplement is inexpensive.

"A solution is to encourage MVM supplementation, particularly in those groups with widespread deficiencies such as the poor, teenagers, the obese and the elderly, in addition to urging people to eating a more balanced diet."

Prof Ames carried out a review of previous research into the effects of inadequate levels of 40 micronutrients in the human diet.

Magnesium deficiency has been associated with bowel and other cancers, high blood pressure, osteoporosis and diabetes.

Insufficient Vitamin D in diets has been linked to colon, breast, pancreatic and prostate cancer, as well as cardiovascular disease. One study found women getting adequate vitamin D were 41 per cent less likely to get multiple sclerosis.

Another found that elderly men given potassium in table salt were 40 per cent less likely to develop cardiovascular disease than those with normal salt in their diet.

Research on laboratory mice have suggested a lack of selenium, found in nuts, cereals, meat, fish, and eggs, can cause DNA damage.

Calcium deficiency has been associated with diabetes, while a lack of Omega 3 fatty acid in diets has been linked to melanoma and other cancers.

Prof Ames is on the scientific advisory board of a company that sells supplements but said he receives no money from the company.

He said many micronutrients play an important role in countering the damage caused to cells and DNA by free radicals, highly reactive chemicals produced during normal biological processes.

<http://www.telegraph.co.uk/earth/main.jhtml?xml=/earth/2008/02/15/scivit115.xml>