

# The Nutrition Reporter™

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## Vitamin “Triage” Theory Enhances Survival, But Boosts Disease Risk

Three years ago, Bruce N. Ames, PhD, of the Children’s Hospital Oakland Research Institute, proposed a triage theory to explain how the body adjusts to a low intake of vitamins and minerals. Ames’ idea is that when vitamin and mineral intake is low, short-term survival takes priority over the long-term risk of developing serious degenerative diseases, such as arthritis, cancer, and heart disease. Consequently, the body directs low levels of vitamins and minerals to the most critical functions to ensure survival.

Last month, Ames and Joyce C. McCann, PhD, used the body’s management of low vitamin K levels as an example to support the triage theory. In essence, when vitamin K levels are low, the vitamin is directed primarily to the liver as a way of preserving its role in maintaining normal blood coagulation, restricting vitamin K in other roles.

“Micronutrient intake below recommended concentrations, but not severe enough to cause overt clinical symptoms, is widespread not only in poor countries but also in the United States (especially in the poor, children, adolescents, the obese, and the elderly), in part because of the high consumption of calorie-rich, micronutrient-poor, unbalanced diets,” Ames and McCann wrote.

Diverting vitamin K primarily to maintaining normal blood clotting, however, comes at a steep price after many years. That’s because vitamin K is also needed to make and maintain strong bones, prevent calcification of the kidneys, protect against coronary calcification (a type of heart disease also known as hardening of the arteries), maintain glucose tolerance, and protect against cancer.

In the short term, there are no significant consequences of low vitamin K intake. Ames and McCann wrote that the triage redirection of vitamin K compensated for occasional deficiencies that occurred during the evolution of life.

Over the long run, though, the risk of serious

health problems increases with prolonged deficiencies of vitamin K and other nutrients.

According to Ames and McCann, most Americans do not obtain the official recommendations for vitamin K. Furthermore, those recommendations are low, and they are based on the amount needed for normal blood clotting, not for the prevention of heart disease, cancer, and other health problems.

According to the researchers, millions of people take warfarin (Coumadin), a prescription anticoagulant drug that interferes with vitamin K. These people live with a medically induced vitamin K deficiency, which has been shown to increase the risk of osteoporosis and likely boosts their risk of other diseases as well.

“The functional spectrum of vitamin K viewed through the lens of the triage theory may provide a helpful way of thinking about the potential effects of vitamin K1 deficiency on age-associated disease,” wrote Ames and McCann. “This is also the case for almost all other micronutrients...In recent years, more probing scientific investigation has begun to unearth subtle long-term health effects of modest deficiencies of many micronutrients...”

*Editor’s note:* If you take warfarin (Coumadin), do not take vitamin K without the explicit approval of your physician. Otherwise, vitamin K is safe.

Reference: McCann JC, Ames BN. Vitamin K, an example of triage theory: is micronutrient inadequacy linked to diseases of aging? *American Journal of Clinical Nutrition*, 2009;90: 889-907. □

### Guest Perspective Statins and Vitamin D

How do cholesterol-lowering statins work? They dramatically raise vitamin D levels.

Several studies have shown that statins raise vitamin D levels but the most recent study showed that Crestor nearly tripled vitamin D levels, from 14 to 36 ng/ml, in just 8 weeks. I loved what the author

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concluded, “We have no idea of the mechanism involved.” Nor do I, as statins should lower, not increase, vitamin D levels because statins reduce vitamin D’s precursor, cholesterol. As Dr. Yavuz said, “This is clearly an opportunity for further research.”

Just think, if the pleiotropic (producing many effects) statin drugs work by simply raising vitamin D levels (and statins’ pleiotropic effects are certainly not mediated through lowering cholesterol levels), then that is one expensive way to raise vitamin D levels. However, it is the perfect commentary on the American health care system; that is, in America we use statins to treat vitamin D deficiency, not vitamin D.

Meanwhile, the second meeting of the new Vitamin D Food and Nutrition Board (FNB) was recently held in Washington, D.C. The talks ranged from “more research is urgently needed,” to “nothing should change until scientists get a lot more money,” to “vitamin D is poison.” Of course it is poison, as Paracelsus said, “All things are poison, and nothing is without poison, only the dose permits something not to be poison.” Yes, vitamin D is used as a rat poison. I love the fact that the U.S. government recommends Americans take a rat poison every day, but they do not recommend enough rat poison.

If the FNB sticks to the current dangerously low daily adequate intake (AI) 200 IU/day recommendations, it will injure pregnant women and their newborn children the most. The reason: the average person will not take a vitamin supplement, but virtually all pregnant women will take one, a prenatal vitamin. If the FNB increases the AI for pregnancy above 400 IU/day, the prenatal vitamin manufacturers will quickly increase the D content of prenatal vitamins, which is now at a meaningless 400 IU/tablet. The good news is that word is spreading; people are talking, telling friends and neighbors how much vitamin D helps.

– John Cannell, MD, President, Vitamin D Council. Reprinted with permission of [www.vitaminDcouncil.com](http://www.vitaminDcouncil.com).

## **CoQ10 Improves Blood Vessel Tone in People with Diabetes**

Poor blood vessel tone, known technically as endothelial dysfunction, increases the risk of heart disease and all types of vascular disease in people with type 2 diabetes. Cholesterol-lowering statin drugs don’t improve endothelial function, but they do interfere with the body’s production of vitamin-like coenzyme Q10 (CoQ10).

Supplemental CoQ10 might rectify the problem,

however, according to a study conducted at the University of Western Australia.

Gerald F. Watts, ScD, and his colleagues treated 23 patients who were overweight, had type 2 diabetes, and were also taking statin drugs. All of the patients had endothelial dysfunction even though their medications controlled their blood sugar, cholesterol, and blood pressure.

The patients were given either 200 mg of CoQ10 or placebos daily for 12 weeks. At the beginning and end of the study, the researchers measured their blood vessel tone using a technique known as flow-mediated dilation.

The improvement in blood vessel tone “may potentially translate to a 10-25 percent reduction in residual cardiovascular risk in these patients,” Watts and his colleagues wrote.

He noted that a previous study found that patients taking statins had below normal levels of CoQ10.

Reference: Hamilton SJ, Chew GT, Watts GF. Coenzyme Q10 improves endothelial dysfunction in statin-treated type 2 diabetic patients. *Diabetes Care*, 2009;118:79-85. □

## **Green Tea Consumption May Slow the Aging Process**

Drinking green tea is associated with longer telomeres – the tips of chromosomes, which contain your genetic material. Telomeres typically shorten with age and each time cells divide.

The finding is potentially significant because, as a consequence, green tea may enhance longevity.

Ruth Chan, PhD, and her colleagues at the Chinese University of Hong Kong, investigated the dietary habits and telomere length of 976 elderly men and 1,020 elderly women.

Men who consumed three or more cups of green tea daily had significantly longer telomeres compared with men who consumed less green tea. The difference in telomere length corresponded to approximately a five-year difference in age – in other words, 70-year-old men who drank green tea had telomeres typical of 65-year-olds.

Green tea was not associated with telomere length in women. However, women who consumed the largest amounts of cooking oils, such as corn and peanut oils, had shorter telomeres.

“The antioxidative properties of tea and its constituents may protect telomeres from oxidative damage in the normal aging process,” wrote Chan and her colleagues. In light of that, the cooking oils might promote oxidation that damages telomeres.

Previous research has shown that magnesium is essential for maintaining telomere length. In

addition, taking daily multivitamin or vitamin B12 supplements appear to maintain longer telomeres.

Reference: Chan R, Woo J, Suen E, et al. Chinese tea consumption is associated with longer telomere length in elderly Chinese men. *British Journal of Nutrition*, 2009: epub ahead of print. □

## Vitamin Supplements Reduce Risk of Death, Study Finds

Taking a multivitamin, vitamin E, or vitamin C supplements can lead to modest reductions in the risk of death.

Gaia Pocobelli, PhD, and her colleagues at the Fred Hutchinson Cancer Research Center, Seattle, analyzed the vitamin supplement habits of 77,719 middle-age and elderly people. About two-thirds of the subjects had taken multivitamins, and about half had taken either vitamin E or vitamin C supplements.

Pocobelli found that the people who took multivitamin supplements the most often – six to seven times each week for at least 10 years – had a 16 percent lower risk of dying from cardiovascular disease.

People who regularly took vitamin E supplements had a 28 percent lower risk of dying from cardiovascular disease. Meanwhile, those who took vitamin C supplements had a slightly lower risk of dying from cancer and other causes.

Reference: Pocobelli G, Peters U, Kristal AR, et al. Use of supplements of multivitamins, vitamin C, and vitamin E in relation to mortality. *American Journal of Epidemiology*, 2009;170:472-483. □

## Sugar Habit As Children Linked to Violent Behavior as Adults

Children who eat a lot of sugary foods are more likely to be arrested and convicted of violent crimes as adults, according to a study by researchers at Cardiff University, Wales.

Simon C. Moore, PhD, and his colleagues tracked 17,415 people born in a single week in April 1970s in the United Kingdom.

The researchers analyzed patterns of the subjects' mental ability at age five and aggression and impulsive behavior at age 10 years. They were considered violent if they had been found guilty of a violent crime between ages 30 and 34 years.

After analysis and reanalysis, "the association between eating confectionary daily remained statistically significant," wrote Moore and his colleagues.

Moore calculated that 69 percent of the subjects who were violent by age 34 had eaten sugary foods every day as children. Only 42 percent of nonviolent

subjects ate sugary foods every day as children.

According to the findings, daily consumption of sugary foods increased the risk of violence by three times, and being male increased the risk by nine times.

Moore wrote that sugary foods also contain various food additives that could contribute to aggressive behavior.

Reference: Moore SC, Carter LM, van Goozen SH. Confectionary consumption in childhood and adult violence. *British Journal of Psychiatry*, 2009;195:366-367. □

## Studies Show Strong Association Between Diet and Depression

Two new studies have found that certain types of eating habits may reduce the odds of feeling depressed.

Almudena Sanchez-Villegas, PhD, of the University of Las Palmas de Gran Canaria, Spain, and her colleagues studied the eating habits of 10,094 healthy Spanish men and women. All of the subjects were assessed and found to be not depressed when the study began.

During an average follow up of 4.4 years, 480 of the subjects had been diagnosed as depressed.

Overall, people who followed a Mediterranean-style diet were the least likely to be depressed.

The researchers used three different statistical approaches to analyze the relationship between the subjects' eating habits and risk of depression. Depending on the model, people who most closely followed a Mediterranean-style diet were 31 to 41 percent less likely to be depressed.

Some specific foods, such as fruits, nuts, olive oil, and legumes were associated with a lower risk of depression.

"However, the role of the overall dietary pattern may be more important than the effect of single components," wrote Sanchez-Villegas and her colleagues. "It is plausible that the synergistic combination of a sufficient provision of omega-3 fatty acids together with other natural unsaturated fatty acids and antioxidants from olive oil and nuts, flavonoids and other phytochemicals fruit and other plant foods, and large amounts of natural folates and other B vitamins in the overall Mediterranean dietary pattern may exert a fair degree of protection against depression."

In the second study, Jean Golding of the University of Bristol, United Kingdom, and her colleagues investigated the eating habits of 9,960 women during their 32nd week of pregnancy and their risk of feeling depressed.

Continues on next page

## Quick Reviews of Recent Research

### • Vitamin D can reduce risk of falls

Consuming at least 700 to 1,000 IU of vitamin D daily can reduce the risk of falls by 22 percent, according to an analysis of eight studies by researchers at University Hospital in Zurich, Switzerland. Vitamin D is needed for the formation of both bones and muscles. However, based on recent research, larger amounts may be needed to reduce the long-term risk of cancer, heart disease, and depression.

Bishoff-Ferrari HA. *BMJ*, 2009;339:b3692 doi 10.1136/bmj.b3692.

### • Probiotic drink may reduce gingivitis

German researchers tested the effects of Yakult, a probiotic-containing drink on 50 healthy college students over eight weeks. Probiotics have been shown to stimulate the immune system and protect against infection. The probiotic drink, which contains *Lactobacillus casei* strain Shirota, led to significant decreases of elastase and matrix metalloproteinase-3 (MMP-3), which are associated with gingivitis. Elastase is an enzyme that breaks down a key tissue protein, and MMP-3 promotes inflammation.

Staab B. *Journal of Clinical Periodontology*, 2009; 36:850-856.

### • Resveratrol may work in part via the brain

Resveratrol, an antioxidant, activates Sirt1, a gene involved in longevity and blood sugar regulation. Both animal and human studies have found that resveratrol supplements help reduce and control

blood sugar levels. In an animal experiment, researchers at the University of Texas Southwestern Medical Center, Dallas, infused resveratrol directly into the brains of obese and diabetic mice. The resveratrol led to a normalization of blood sugar levels and significantly reduced insulin levels in the laboratory animals.

Ramadori G. *Endocrinology*, 2009; doi 10.1210/en.2009-0528.

### • N-acetylcysteine protects kidneys

Injected chemicals to improve contrast and x-ray imaging in hospitals is a major cause of “contrast-induced nephropathy,” or a type of kidney failure. However, researchers at the Medical College of Wisconsin, Milwaukee, have reported that N-acetylcysteine (NAC), a common and inexpensive anti-oxidant, can reduce the incidence of contrast-induced nephropathy. The researchers analyzed 16 studies including 1,677 patients and concluded that NAC reduced the risk of nephropathy by 54 percent.

Trivedi H. *American Journal of Medicine*, 2009;122: 874 e9-15.

### • Drugs do not cure type 2 diabetes

Researchers from Harvard University, Boston, analyzed the effects of metformin (Glucophage) or insulin on 500 people with type 2 diabetes. Metformin, often used in combination with insulin, led to significant reductions in blood sugar levels. However, neither metformin nor insulin led to reductions in C-reactive protein (CRP), a key marker of inflammation. In other words, inflammatory processes continued even though blood sugar levels improved. The authors recommended that other therapies be used to reduce cardiovascular risks among patients with diabetes, including weight management, exercise, and other therapies.

Pradhan AD. *JAMA*, 2009;302:1186-1194.

## Diet and Depression...

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Golding reported that women who ate the most fish – three or more servings weekly, equivalent to 1.5 grams of omega-3 fats – were the least likely to be depressed.

Women who consumed little or no fish were about 50 percent more likely to be depressed.

“A committee of the American Psychiatric Association has recommended consuming two or more portions of fish per week to avoid depression among the nonpregnant adult population, with additional omega-3 supplementation in the presence of emotional disorders,” noted Golding.

References: Sanchez-Villegas A, Delgado Rodriguez M, Alonso A, et al. Association of the Mediterranean dietary pattern with the incidence of depression. *Archives of General Psychiatry*, 2009;66:1090-1098. Golding J, Steer C, Emmett P, et al. High levels of depressive symptoms in pregnancy with low omega-3 fatty acid intake from fish. *Epidemiology*, 2009;20:598-603. □

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#### The Nutrition Reporter™

Post Office Box 30246 • Tucson AZ 85751-0246 USA

Editor and Publisher: Jack ChalleM

Copy Editor: Mary E. Larsen

#### Medical and Scientific Advisors

Richard P. Huemer, MD Lancaster, Calif. • Ralph K. Campbell, MD Polson, Montana

Peter Langsjoen, MD Tyler, Texas • Ronald E. Hunninghake, MD Wichita, Kansas

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