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Vitamin K: Often Ignored, Research Finds It's Essential for Preventing Osteoporosis

Vitamin K is routinely ignored and sometimes the subject of warnings, especially to patients taking anticoagulant medications. The vitamin has long been known for its role in forming blood clots, without which people would bleed to death.

But recent research has focused on the role of vitamin K in bone health. It's needed to make bone proteins, such as osteocalcin, which form a matrix with calcium and magnesium. Studies of postmenopausal women have found that high doses of supplemental vitamin K can strengthen bones and greatly reduce the risk of fractures. People taking anticoagulant medications tend to be deficient in vitamin K, increasing their risk of osteoporosis.

In a recent study, Cees P.H.J. Vermeer, PhD, and his colleagues at the University of Maastricht, Netherlands, asked 325 postmenopausal women to take either 45 mg of vitamin K daily – a hefty dose – or placebos daily for three years. Vermeer used vitamin K2, which is also known as menatetrenone and MK-4, the most biologically active form of the vitamin.

Women taking the vitamin K supplements had improvements in bone mineral content and the width of the femoral neck bone. Meanwhile, their hip bone strength remained steady during the three-year study, while hip bone strength decreased significantly among women taking placebos.

In a second study, Vermeer and his colleagues looked at the osteocalcin-making ability of people taking anticoagulant drugs. Vermeer found that their ability to make this bone protein was impaired, and noted that most of the individuals were “subclinically vitamin K-deficient.”

In another study, Sarah Cockayne, MSc, of the University of York, England, and her colleagues analyzed seven clinical trials in which vitamin K was given to prevent fractures. Six of the seven studies showed benefits from taking vitamin K supplements – most using high doses of 45 mg daily.

When Cockayne pooled the data from all the studies, she found that vitamin K decreased back fractures by 60 percent, hip fractures by 77 percent, and all nonvertebral fractures by 81 percent.

References: Knapen MHJ, Schurgers LJ, Vermeer C. Vitamin K2 supplementation improves hip bone geometry and bone strength indices in postmenopausal women. *Osteoporosis International*, 2007;8:963-972. Cranenburg ECM, Schurgers LJ, Vermeer C. Vitamin K: The coagulation vitamin that became omnipotent. *Thrombosis and Haemostasis*, 2007;98:120-125. Cockayne S, Adamson J, Lanham-New S, et al. Vitamin K and the prevention of fractures. *Archives of Internal Medicine*, 2006; 166:1256-1261. □

Perspectives...

Mercury, Vaccines, and Autism

I recently listened to a PBS radio show on the autism controversy – that is, whether mercury in vaccines might be a cause of autism. Mercury is part of a compound called thimerosal (which has various spellings), used as a preservative in vaccines.

Many parents have insisted that their children were developing normally until they received a battery of vaccines, when they suddenly developed autism. But on the show, expert after expert, as well as a few journalists, completely dismissed the firsthand empirical observations of parents. They said that studies and statistics could not substantiate a link between vaccines, thimerosal, and autism. To them, the studies and the statistics were simply infallible.

But statistics can't account for everything. The late Bernard Rimland, PhD, founder of the Autism Research Institute, San Diego, was an advocate of the nutritional treatment of autism, and he explained a possible mechanism for thimerosal's disastrous effects: many vaccines come in multidose bottles that

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are supposed to be shaken before a dose is drawn out with a syringe.

Rimland suspected that the bottles were not always shaken vigorously to distribute and thereby dilute the thimerosal. Instead, the mercury often concentrated in the last dose at the bottom on the bottle. The high dose of mercury didn't affect every child receiving the last dose in the bottle. The most vulnerable children were those with either a genetic weakness or nutritional deficiencies, which would impair the body's ability to deal with the mercury.

There's another problem with the nature of medical studies on autism and other disorders. The risk of disease is almost always defined statistically, such as in what researchers call risk ratios or odds ratios. For example, you might have a 20 percent higher risk of developing serious disease because of certain dietary or lifestyle habits.

But statistics applies to groups, not individuals, something scientists often forget. Those statistics become meaningless if you happen to be the person diagnosed with a serious disease, whether it's autism or heart disease. In my mind, the lack of statistical support for the role of mercury in autism reflects a failing of data compilation and analysis, and it should not be interpreted as a lack of evidence. —*JC*

Cod Liver Oil, Rich in Omega-3s, May Protect Against Depression

Researchers from Norway have reported new evidence that omega-3 fish oils can help prevent depression.

Maria Boroy Raeder, MD, of Haukeland University Hospital in Bergen, Norway, and her colleagues analyzed data from a study of almost 22,000 middle age and elderly men and women. Overall, 3.6 percent of the subjects had "high levels" of depressive symptoms.

But on average, symptoms of depression were significantly lower among the people – 9 percent of the group – who took cod liver oil daily.

Symptoms of depression affected only 2.5 percent of the people taking cod liver oil, compared with 3.8 percent in the rest of the group. In effect, people taking cod liver oil were almost 30 percent less likely to be depressed.

In addition, the prevalence of depression decreased as people took cod liver oil for longer periods of time.

Raeder and her colleagues estimated that the a daily dose of cod liver oil contained 0.7 to 1.2 grams of omega-3 fats, including 0.3 to 0.6 grams of eicosapentaenoic acid (EPA) and an equal amount of

docosahexaenoic acid (DHA). The cod liver oil also provided about 400 IU of vitamin D each day.

Reference: Raeder MB, Steen VM, Vollset SE, et al. Associations between cod liver oil and use and symptoms of depression: the Hordaland health study. *Journal of Affective Disorders*, 2007;101:245-249. □

Grainless Diet Works Better than Mediterranean Diet for Blood Sugar

Eating a Paleolithic-style diet with lean meat, fish, fruits, vegetables, eggs, and nuts – but no grain products – improves blood sugar far better than the often recommended Mediterranean diet, which includes whole grain breads.

Staffan Lindeberg, MD, PhD, and his colleagues at Lund University, Sweden, asked 29 patients to follow either a Paleo-style diet or a Mediterranean-style diet for 12 weeks. All of the patients had serious heart disease, plus either type 2 diabetes or a less severe form of glucose intolerance.

By the end of the study people eating a Paleo diet had an average 26 percent decrease in blood sugar levels, compared with only a 7 percent decrease among those eating the Mediterranean diet.

People following the Paleo diet also had an average 2.2-inch decrease in waist circumference, compared with a 1.1-inch decrease in the Mediterranean diet group. There was also a tendency toward lower insulin levels in the Paleo diet group.

Calorie intake ended up being 25 percent lower in the Paleo diet group – “despite similar quantities of consumed food,” according to Lindeberg.

“We found marked improvement of glucose tolerance after advice to eat a Paleolithic diet, based on lean meat, fish, fruits, vegetables, root vegetables, eggs and nuts as staple foods, while avoiding cereals, dairy products, refined fat, sugar and salt,” he wrote.

Reference: Lindeberg S, Jonsson T, Granfeldt Y, et al. A Paleolithic diet improves glucose tolerance more than a Mediterranean-like diet in individuals with ischemic heart disease. *Diabetologia*, 2007; 50:1795-1807. □

Trans Fats Directly Linked to Belly Fat and Reduced Insulin Function

Trans fats have long been recognized for their role in raising blood levels of cholesterol and the “bad” low-density lipoprotein (LDL) form of cholesterol – and increasing the risk of heart disease. But research dating back to 1982 indicates that trans fats, found in partially hydrogenated vegetable oils, can fundamentally alter how the body metabolizes fat in general.

In the latest study along these lines, Kylie Kavanaugh, DVM, and her colleagues at the Wake Forest University School of Medicine, Winston-Salem, North Carolina, fed 42 male monkeys diets containing either monosaturated fats (similar to what's found in olive oil) or an equal amount of partially hydrogenated soybean oil with trans fats. The fats amounted to about 8 percent of the animals' calories for six years, with the total number of calories aimed at maintaining the animals' weight.

The animals consuming trans fats – in the absence of excess calories – gained significantly more weight and body fat, compared to animals not eating trans fats.

Monkeys eating trans fats increased their weight by 7.2 percent, compared with only 1.78 percent in those not eating trans fats. In addition, animals eating trans fats gained 33 percent more abdominal fat.

Although both groups had increases in blood glucose levels, animals eating trans fats had insulin levels three times higher – a sign of prediabetic insulin resistance. In addition, their levels of fructosamine (a long-term marker of blood glucose, similar to HbA1c) increased by 27 percent.

“Data suggest that the incidence of type 2 diabetes mellitus would be reduced by more than 40 percent if these oils were consumed in their original, unhydrogenated form,” wrote Kavanaugh and her colleagues.

The partially hydrogenated soybean oil used in the study provides 80 to 90 percent of the trans fats in the typical American diet.

“Acknowledging this [trans fats] as a risk factor can promote early diagnosis of prediabetes and initiate efforts to reverse or delay its onset,” the researcher wrote.

Reference: Kavanaugh K, Jones KL, Sawyer J, et al. Trans fat diet induces abdominal obesity and changes in insulin sensitivity in monkeys. *Obesity*, 2007;15:1675-1684. □

More Research: N-acetylcysteine Helpful in Cocaine Abuse

Research studies have found that the antioxidant N-acetylcysteine (NAC) has therapeutic benefits in the treatment of cocaine addiction, obsessive-compulsive disorder, and self-mutilation. Now another study has found that this remarkable nutrient-like substance can help reduce desire for cocaine.

Peter W. Kalivas, PhD, of the Medical University of South Carolina, Charleston, and his colleagues treated 15 “nontreatment seeking” men and women

for cocaine abuse. Kalivas gave the subjects 600 mg of NAC or placebos every 12 hours for three days. After a four-day break, NAC and placebos were reversed for three more days, so that all of the subjects received both NAC and placebos.

The researchers measured the subjects' responses to photographs of cocaine-related paraphernalia. Cravings, desire to use, and interest in cocaine-related materials decreased by about 20 percent when the patients were taking NAC.

NAC is the medical treatment of choice for acetaminophen (Tylenol) poisoning, and it is also a primary treatment for lung congestion.

Reference: LaRowe SD, Myrick H, Hedden S, et al. Is cocaine desire reduced by N-acetylcysteine? *American Journal of Psychiatry*, 2007;164:1115-1117. □

Combination of Vitamin D and Calcium Can Lower Risk of Type 2 Diabetes

A growing body of research has found that high intake of vitamin D and calcium, including from supplements, can reduce the odds of developing type 2 diabetes. More than 1 million new cases of diabetes are diagnosed each year in the United States.

Anastassios G. Pittas, MD, of the Tufts-New England Medical Center, Boston, and his colleagues reviewed the published medical literature and conducted a meta-analysis of studies on vitamin D and calcium in type 2 diabetes.

According to Pittas, observational studies have found a “relatively consistent association” between low consumption of vitamin D and calcium and the risk of developing type 2 diabetes. People with low intakes of these two nutrients have as much as a 64 percent greater risk of developing diabetes, as well as a 29 percent greater risk of developing metabolic syndrome. Conversely, women with high intakes of vitamin D and calcium had a 33 percent lower risk of becoming diabetic.

In a clinical trial, people with impaired glucose tolerance who took 700 IU of vitamin D and 500 mg of calcium had a much lower rise in fasting blood sugar after three years – 0.4 mg/dl versus 6.1 mg/dl – compared with those who did not take the supplements.

Both vitamin D and calcium are needed for normal insulin function.

Reference: Pittas AG, Lau J, Hu FB, et al. The role of vitamin D and calcium in type 2 diabetes. A systematic review and meta-analysis. *Journal of Clinical Endocrinology and Metabolism*, 2007;92:2017-2029. □

More research summaries on next page

Quick Reviews of Recent Research

• Supplements protect hearing loss from noise

A combination of two popular supplements, N-acetylcysteine (NAC) and acetyl-L-carnitine (ALC) can prevent noise-induced hearing loss, according to the findings of an animal study. When California researchers fed supplemental NAC and ALC to the animals one to four hours after exposure to loud noises, the loss of hair cells (that pick up sound vibrations) in the ears was significantly reduced and permanent hearing loss prevented.

Coleman JKM, et al. *Hearing Research*, 2007; 226:104-113.

Two Reports Provide Gloomy Numbers for Fruit and Vegetable Consumption

It's often easy to take supplements and ignore the fundamental importance of a good dietary foundation. Two new studies indicate that relatively few American consume adequate amounts of nutrient-rich fruits and vegetables, which can lower the risk of heart disease, cancer, diabetes, and many other diseases.

One study, by the Centers for Disease Control and Prevention (CDC), Atlanta, was based on the dietary habits of more than 305,000 Americans. It found that just over one-fourth of Americans – 27.2 percent – ate vegetables three or more times daily. Almost one-third – 32.6 percent – ate two or more fruits each day. The CDC also reported that average vegetable consumption decreased slightly between the mid-1990s and 2002, from 3.4 to 3.2 servings daily.

A separate study, conducted by Tiffany L. Gary, PhD, of the Johns Hopkins School of Public Health, Baltimore, painted a more bleak picture. Based on data from almost 24,000 Americans, the researchers found that vegetable consumption declined from 35 to 32 percent during the periods of 1988-1994 and 1999-2002. Fruit consumption increased slightly from 27 to 28 percent during these periods.

“Only 11 percent met United States Department of Agriculture guidelines for both fruits and vegetables in 1988-1994 and 1999-2002, indicating no change in consumption,” wrote the researchers.

References: Centers for Disease Control and Prevention. Fruit and vegetable consumption among adults--United States, 2005. *MMWR Morbidity and Mortality Weekly Report*, 2007;56:213-217. Casagrande SS, Wang Y, Anderson C, et al. Have Americans increased their fruit and vegetable intake? The trends between 1988 and 2002. *American Journal of Preventive Medicine*, 2007;32:257-263. □

• Calcium intake low among Americans

A large population-based study by researchers at Stanford University, California, has calculated that 60 percent of Americans do not consume adequate amounts of calcium – even though 48 percent of the study group took supplements. The researchers calculated that low calcium intake almost doubled the risk of developed osteoporosis.

Ma J, et al. *American Journal of Clinical Nutrition*, 2007;85:1361-1366.

Turmeric protects against Alzheimer's

In cell experiments, researchers found that bisdemethoxycurcumin, found in the spice turmeric, can improve immune activity, which helps remove amyloid plaques in the brain. Amyloid plaques are a characteristic of Alzheimer's disease. The researchers found that bisdemethoxycurcumin increased the activity of macrophages, a type of white blood cell. The turmeric compound also increased the activity of genes involved in stimulating immunity.

Fiala M, et al. *Proceedings of the National Academy of Sciences*, 2007;104:12849-12854.

• Vitamins C and E improve blood-vessel tone

Italian researchers asked 30 men with untreated hypertension to take either a combination of vitamin C (1 gram) and vitamin E (400 IU) or placebos daily for eight weeks. After supplementation, endothelial function – blood vessel tone and blood flow – improved significantly. Endothelial dysfunction, which involves stiff blood vessels that are unable to dilate, is a contributing factor in hypertension, a leading risk factor for coronary heart disease.

Plantinga Y, et al. *American Journal of Hypertension*. 2007;20:329-397.

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