

The Nutrition Reporter™

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Both Vitamin D and Curcumin Found to Protect Against Type 2 Diabetes

New research suggests that two common nutritional supplements – vitamin D and curcumin – can lower the risk of type 2 diabetes. The findings are significant given that some 25.6 million Americans have type 2 diabetes and upwards of 100 million have some degree of prediabetes.

Langjian Liu, MD, PhD, and his colleagues at Drexel University, Philadelphia, Pennsylvania, analyzed data collected from 12,900 people. They focused on the relationship between obesity, insulin resistance, and vitamin D levels.

Obesity is a well-known risk factor for type 2 diabetes. People who were obese and had normal blood levels of vitamin D were almost 20 times more likely to have insulin resistance – the hallmark of prediabetes and type 2 diabetes – compared with the overall study population.

But among people who were obese and had low vitamin D levels, insulin resistance was 32 times more common than average.

Other studies have shown that vitamin D is needed for normal insulin function and the regulation of blood sugar.

Liu and his colleagues noted that obese subjects are at high risk of vitamin D deficiency because the vitamin gets stored in fat tissue, preventing it from being used by the rest of the body.

In another study, Somlak Chuengsamarn, MD, and colleagues from the HRH Princess Maha Chakri Sirindhorn Medical Center, Thailand, had 240 adults with prediabetes take either curcumin capsules or placebos daily for nine months.

Curcumin is an antioxidant and anti-inflammatory extract of turmeric root, which is ground up and used as a spice in southeast Asian cuisine. Subjects taking curcumin took six capsules daily of “curcuminoids,” which refers to a number of related compounds, totaling 1,500 mg daily.

Chuengsamarn analyzed data for 138 of the subjects. By the end of the study, 19 of the 116

people taking placebos had developed type 2 diabetes. However, not a single person taking curcumin had developed diabetes.

Tests determined that curcumin improved the function of beta cells, which produce insulin. The subjects also had lower levels of insulin resistance.

“A nine-month curcumin intervention of a prediabetes population significantly lowered the number of prediabetic individuals who eventually developed type 2 diabetes mellitus,” the researchers wrote.

References: Kabadi SM, Lee BK, Liu L. Joint effects of obesity and vitamin D insufficiency on insulin resistance and type 2 diabetes. *Diabetes Care*, 2012; epub ahead of print. Chuengsamarn S, Rattanamongkolgul S, Luechapudiporn R, et al. Curcumin extract for prevention of type 2 diabetes. *Diabetes Care*, 2012; epub ahead of print. □

Perspectives

Shorter Days Call for Vitamin D

This issue of *The Nutrition Reporter* contains eight reports on vitamin D, reflecting the intense ongoing research on this essential nutrient.

If we spent 10 to 15 minutes in the sun every day, we would make plenty of our own vitamin D, the so-called sunshine vitamin. But people tend to shy away from the sun, or lather up on sunscreen, which blocks the production of vitamin D. Or they spend too much time in their homes (watching television or on the computer), at work, or in their cars. It’s no big surprise then that three of every four Americans are deficient in vitamin D.

Even if you have made ample amounts of vitamin D this past summer, your levels are now starting to decrease with fewer daylight hours and a sun that shines lower on the winter horizon. If you live north of 35° latitude (roughly Phoenix or Atlanta), the sun will be too low during the winter to stimulate your body’s production of vitamin D.

More research summaries on next page

Supplementation therefore becomes a necessity. A recent study found that taking 2,000 IU daily was not sufficient for boosting vitamin D levels into the normal range. The researchers found that 5,000 IU did the job. If you decide to have your doctor test your blood level of vitamin D, he will probably say that any level about 30 ng/mL are fine. However, vitamin D levels must be at least 45 ng/mL to activate enzymes that depend on the vitamin. –*JC*

Supplemental Vitamin D and Calcium May Reduce Death Risk

At lot of things can shorten your normal life expectancy. Heart disease. Cancer. Smoking. Car accidents. And you can add a new one: not taking vitamin D and calcium supplements.

Lars Reynmark, PhD, Aarhus University Hospital, Denmark, and his colleagues wrote that vitamin D can affect the risk of many different diseases, so it's likely to also influence the risk of death. Based on this line of thinking, Reynmark analyzed data from eight studies of people who were given vitamin D or vitamin D plus calcium supplements or placebos. Data from more than 70,000 people were included in the analysis; 90 percent of the subjects were women.

Vitamin D supplements alone did not seem to affect mortality, but a combination of vitamin D and calcium was associated with a 7 percent lower risk of death. In a separate analysis of 24 studies consisting of more than 88,000 people, Reynmark found a similar relationship between the supplements and a lower risk of death.

Reference: Reynmark L, Avenell A, Masud T, et al. Vitamin D with calcium reduces mortality: patient level pooled analysis of 70,528 patients from eight major vitamin D trials. *Journal of Clinical Endocrinology and Metabolism*, 2012: doi 10.1210/jc.2011-3328. □

Vitamin D3 Better than D2, While D2 Lowers D3 Levels

Several studies have shown that vitamin D3 is absorbed far better than vitamin D2. A new study has found that taking vitamin D2 might actually lower a person's blood levels of vitamin D3.

Both vitamin D3 and D2 are found in dietary supplements, and vitamin D2 is often used to fortify milk and other foods.

Lisa A. Houghton, PhD, of the University of Otago, New Zealand, and her colleagues gave 1,000 IU of either vitamin D3 or D2, or placebos, to 95 subjects. The study participants took the capsules for 25 weeks, starting at the end of summer, and had

blood levels of vitamin D measured at various times during the study.

Over the following winter, people who were taking vitamin D2 supplements ended up with *lower* levels of vitamin D3, a precursor to the active form of the vitamin. In contrast, people who were taking vitamin D3 supplements were better able to maintain their blood levels of the nutrient.

People taking vitamin D2 had blood levels of the vitamin that were 8.4 ng/mL (21 nmol/L) lower than those who had been taking vitamin D3.

Reference: Logan VF, Gray AR, Peddie MC, et al. Long-term vitamin D3 supplementation is more effective than vitamin D2 in maintaining serum 25-hydroxyvitamin D status over the winter months. *British Journal of Nutrition*, 2012: doi10.1017/S0007114512002851 □

High Vitamin D May Give Breast Cancer Patients a Better Chance

Maintaining normal to high levels of vitamin D appears to give women an edge when it comes to surviving breast cancer.

Hans Wildiers, MD, of University Hospitals, Leuven, Belgium, and his colleagues studied 1,800 women whose vitamin D levels were measured at the time of diagnosis. Roughly one-third of the subjects had normal or high levels of the vitamin, marginal deficiencies, or serious deficiencies of the vitamin.

Lower vitamin D levels correlated strongly with larger tumor sizes at the time of diagnosis, whereas higher vitamin D levels were associated with smaller tumor sizes.

Women with higher vitamin D levels were more likely to live longer. After three years of follow up, postmenopausal women who had high vitamin D levels were more likely to have a longer period of being disease free.

On average, women with high levels of vitamin D had blood levels measuring 40 ng/mL. Women classified as marginal had levels measuring 28 ng/mL, and those who were deficient averaged blood levels of 14 ng/mL.

Reference: Hatse S, Lambrechts D, Verstuyf A, et al. Vitamin D status at breast cancer diagnosis: correlation with tumor characteristics, disease outcome, and genetic determinants of vitamin D insufficiency. *Carcinogenesis*, 2012;33:1319-1326. □

Vitamin D Supplements Reduce Relapses in Multiple Sclerosis

Considerable research suggests that inadequate sunlight exposure – and therefore low vitamin D production – is a contributing factor to multiple sclerosis (MS). In general, the incidence of MS

increases in populations living farther from the equator. The exception to this pattern is in regions where people eat large amounts of fresh fatty fish, which is high in vitamin D.

Jean-Claude Souberbielle, PhD, of René Descartes University, Paris, and his colleagues asked 156 patients with relapsing-remitting MS to take about 3,000 IU of vitamin D daily. All of the patients had blood levels of vitamin D no higher than 40 ng/mL (100 nmol/L).

The researchers determined the patients' relapse rates for about two and one-half years before starting vitamin D supplements and again for about two and one-half years while taking the supplements.

Souberbielle wrote that "we found a significant strong inverse relationship between the relapse incidence rate and the 25-OH-D [vitamin D] level, suggesting that vitamin D did indeed influence the relapse rate."

For every 4 ng/mL (10nmol/L) increase in vitamin D blood levels, the relapse rate decreased by almost 14 percent. The benefits increased until blood levels of the vitamin reached 44 ng/mL, after which they plateaued.

Reference: Pierrot-Deseilligny C, Rivaud-Pechoux S, Clerson P, et al. Relationship between 25-OH-D serum level and relapse rate in multiple sclerosis patients before and after vitamin D supplementation. *Therapeutic Advances in Neurological Disorders*, 2012;5:187-198. □

Taking Vitamin D Supplements Lowers Seniors' Risk of Fracture

Vitamin D supplements can lower the risk of fractures, but there's a catch. You have to take enough of the vitamin, an amount above the typical government recommendation.

Heike A. Bischoff-Ferrari, MD, DrPH, of the University of Zurich, Switzerland, and her colleagues analyzed data from 11 double-blind studies in which seniors were given either vitamin D supplements or placebos. More than 31,000 people, age 65 and older, were included in the analysis, of whom 1,111 had hip fractures and 3,770 had various types of fractures other than those of the backbone.

Vitamin D reduced the risk of hip fracture by 30 percent – but only among people who took 800 to 2,000 IU of the vitamin daily. In addition, people taking this range of vitamin D dosage had a 14 percent lower risk of other types of fractures, except for those of the backbone.

Reference: Bischoff-Ferrari HA, Willett WC, Orav EJ, et al. A pooled analysis of vitamin D dose requirements for fracture prevention. *New England Journal of Medicine*, 2012;367:40-49. □

Vitamin D Impacts Frailty and Risk of Death Among Seniors

Vitamin D is needed to make muscle, but among seniors, an age-related loss of muscle can lead to physical frailty. And being frail does more than reduce a person's strength and physical activity – it increases the risk of dying.

However, maintaining high blood levels of vitamin D can protect against frailty and reduce the risk of death.

Ellen Smit, PhD, of Oregon State University, and her colleagues analyzed 12 years of data from 4,731 people. Their definition of frailty was based on having three of five traits: low body mass index (BMI), slow walking, weakness, exhaustion, and low physical activity. Pre-frailty was defined as having one of those traits.

Vitamin D blood levels were lowest in people who were frail. Furthermore, people with low levels of vitamin D were 30 percent more likely to die, compared with those who had higher levels of the vitamin.

Smit found that people who were both frail and had low vitamin D levels had the greatest risk of dying – three times higher than people who had adequate vitamin D levels and were not frail.

Reference: Smit E, Crespo CJ, Michael Y, et al. The effect of vitamin D and frailty on mortality among non-institutionalized US older adults. *European Journal of Clinical Nutrition*, 2012: doi 10.1038/ejcn.2012.67. □

Vitamin D May Prevent Foot Infections in Diabetic Patients

Vitamin D plays a multitude of roles in health, including regulating insulin and blood sugar and fighting infections. In a new study, doctors have found that people with diabetes have a very high risk of foot infections if they lack vitamin D.

The problem is serious because a minor injury, such as from a stone in a shoe, can lead to a serious infection and possibly amputation.

Surya Kumar Singh, MD, of Banaras Hindu University, India, and his colleagues compared vitamin D blood levels in 125 diabetic patients with foot infections and 164 diabetic patients without infections over the course of a year.

Patients with foot infections were four times more likely to have a severe deficiency of vitamin D.

Reference: Tiwari S, Pratyush DD, Gupta B, et al. Prevalence and severity of vitamin D deficiency in patients with diabetic foot infection. *British Journal of Nutrition*, 2012: doi 10.1017/S0007114512000578. □

Quick Reviews of Recent Research

• Zinc helpful in treating common colds

Canadian physicians analyzed 17 studies, including 1,221 people, who took zinc lozenges or placebos to reduce symptoms of the common cold. Zinc led to shorter infections and fewer symptoms in adults but not children.

Science M. *Canadian Medical Association Journal*, 2012; doi 10.1503/cmaj.111990.

• Alcohol and sugar combo hurts blood sugar

Researchers in Finland tried to determine the effects of alcohol and glucose on blood sugar. In a crossover design, they had 10 healthy subjects consume beer, nonalcoholic beer, and a glucose solution with alcohol. The alcohol-glucose solution led to a strong increase in post-meal blood sugar levels. They concluded that the glycemic index values of beers have underestimated their true effects on blood sugar.

Hatonen K. *American Journal of Clinical Nutrition*, 2012; 96:44-49.

• Kudzu extract reduces boozing

The plant kudzu (*Pueraria lobata*) has been used to treat alcoholism. Researchers at McLean Hospital, Massachusetts, gave a kudzu extract, puerarin, or placebos to 10 men and women in their twenties. When taking placebos, the subjects consumed an average of 3.5 beers in an apartment-like setting. After taking puerarin (a nonestrogenic isoflavone) for one week, they consumed only 2.4 beers. The researchers believe that the puerarin extract of kudzu may curb alcoholism and binge drinking.

Penetar DM. *Drug and Alcohol Dependence*, 2012; epub ahead of print.

• L-carnitine may help in pancreatic cancer

Pancreatic cancer typically has a poor prognosis, and cachexia (muscle and weight loss) is usually suggestive of reduced life expectancy. A team of German researchers gave either 4 grams of L-carnitine or placebos to 72 patients with advanced pancreatic cancer. The patients took the supplements for 12 weeks. Overall, patients who took L-carnitine supplements had longer survival times and spent fewer days in hospitals.

Kraft M. *Nutrition Journal*, 2012;11: doi 10.1186/1475-2891-11-52.

• Maybe Popeye was right about spinach

A compound naturally found in spinach appears to increase muscle strength, according to a study on mice. Researchers from Sweden's Karolinska Institute added inorganic nitrate to the drinking water of laboratory mice. The nitrate stimulated the production of two important proteins, leading to stronger muscles. The amount of nitrate was

equivalent to what a person would consume in 200 to 300 grams of spinach.

Hernandez A. *Journal of Physiology*, 2012; doi 10.1113/jphysiol.2012.232777.

• DHA helps build better memories

The omega-3 fatty docosahexaenoic acid (DHA) is essential for brain development in infants and is known to improve mood and memory in adults. Canadian researchers conducted an animal experiment to determine exactly why DHA improves memory. When they compared the effects of a regular diet and a high-DHA diet in mice, the researchers discovered that DHA levels in the hippocampus increased by 30 percent. The higher concentration of DHA in this part of the brain led to memory cells that better communicated with each other.

Connor S. *Applied Physiology, Nutrition, and Metabolism*, 2012; doi 10.1139/h2012-062.

• L-tryptophan influences gut inflammation

The relationship between diet, intestinal bacteria, and immunity continues to expand. A team of Austrian and German researchers were studying the role of an enzyme, angiotensin converting enzyme 2 (ACE2), which is involved in blood pressure. In the process they discovered that the enzyme also controls how L-tryptophan, an amino acid found in protein, functions. When people do not consume sufficient L-tryptophan, the types of bacteria in our digestive tract changes, leading to diarrhea and inflamed intestines. When the researchers increased the amount of L-tryptophan in the diets of laboratory mice, their gut bacteria returned to normal and their inflammation decreased. The findings are particularly relevant to people who suffer from protein malnutrition, who often develop diarrhea and inflamed intestines.

Hashimoto T. *Nature*, 2012;487:477-481.

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