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More Protein, Less Carbs Reduce Appetite and Weight – and Exercise Helps, too

The shrill arguments in favor of and against high-protein diets are giving way to broad acceptance of a profoundly simple idea: eating a little more protein and a little less carbohydrate – without going on a so-call high-protein diet – leads to lower appetite and greater weight loss.

In a recent study, David S. Weigle, MD, of the University of Washington School of Medicine, Seattle, and his colleagues placed 19 overweight but otherwise healthy middle-age adults on three diets. For two weeks, they ate a weight-maintaining diet consisting of 15 percent protein, 35 percent fat, and 50 percent carbohydrate. For the next two weeks, they ate a weight-reduction diet consisting of 30 percent protein, 20 percent fat, and 50 percent carbohydrate.

Then, for 12 weeks, the subjects were allowed to eat as much as they wanted, while maintaining the 30-percent protein diet. The amount of dietary carbohydrate remained the same.

During the higher protein phase of the study, feelings of being full increased and appetite decreased. The subjects spontaneously reduced their food intake by about 441 calories daily, losing an average of eight pounds of body weight during the study.

"An increase in dietary protein from 15 percent to 30 percent [of total calories]...produces a sustained decrease in ad libitum caloric intake," even though the percentage of carbohydrates remained consistent...This anorexic effect of protein may contribute to the weight loss produced by low-carbohydrate diets," Weigle wrote.

In a separate study, Donald K. Layman, PhD, and his colleagues at the University of Illinois, Urbana, placed 48 middle-age women on one of two diets – high protein/low carbohydrate or low protein/high carbohydrate. Some of the women from each group also began exercising regularly.

All of the subjects lost weight, but those on the high-protein diet and the high-protein diet plus exercise lost the most body fat and the least lean muscle mass. Layman described the benefit of exercise as being "additive" – that is, further promoting fat loss.

Women who ate the high-protein diet and also exercised lost 21.4 percent of their body fat. In contrast, those on the high-carbohydrate diet without exercising lost only 12.8 percent of body fat.

The two diets produced different changes in blood fats. The high-protein diet led to lower levels of triglycerides and higher levels of the "good" high-density lipoprotein cholesterol. In contrast, the high-carbohydrate diet led to lower levels of total cholesterol and the "bad" low-density lipoprotein cholesterol.

References: Weigle DS, Breen PA, Matthys CC, et al. A high-protein diet induces sustained reductions in appetite, ad libitum caloric intake, and body weight despite compensatory changes in diurnal plasma leptin and ghrelin concentrations. *American Journal of Clinical Nutrition*, 2005;82:41-48. Layman DK, Evans E, Baum JI, et al. Dietary protein and exercise have additive effects on body composition during weight loss in adult women. *Journal of Nutrition*, 2005;135:1903-1910. ❑

Perspectives...

Redefining the Meaning of Deficiency

Many of us were taught that vitamin deficiencies were horrible diseases such as scurvy, beriberi, and pellagra – each often characterized by the body literally falling apart. Relatively common 100 years ago these diseases are now considered rare.

But it is a mistake to consider these "classic" deficiency diseases the first sign of compromised nutrition. Rather, these diseases consist of the final burst of symptoms – what some people in medicine refer to as "total system failure" – before death.

It is equally foolish to believe that nutritional deficiencies are rare today. Often the signs of marginal nutritional intake or early deficiency are more

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difficult to assess, in large part because their symptoms may be vague and because health-care professions simply don't bother investigating them.

For example, a vitamin C-deprivation study found that the first signs of deficiency were not those of scurvy, but rather irritability and fatigue – two extremely common symptoms. That should not come as a surprise because 30 to 48 percent of Americans do not consume the "recommended" amounts of vitamin C, indicating that their nutritional status is marginal at best.

Studies show similar patterns with other nutrients. A study of magnesium intake in the elderly found that one-fourth of subjects did not consume the officially recommended daily amounts. Similarly, 93 percent of Americans do not consume the recommended levels of vitamin E. In another study, researchers reported that 98 percent of patients hospitalized for hip fractures were either deficient or had marginal blood levels of vitamin D.

Vitamins and minerals directly or indirectly play roles in the thousands of biochemical reactions that occur in our bodies every second of the day. Without them, these chemical processes become sluggish or cease. The situation is analogous to using yeast to make dough rise. If yeast is not present, the dough does not rise to make bread.

Yet the average person, subsisting on fast foods and convenience foods (instead of fresh wholesome foods), most likely has a marginal intake of many vitamins and minerals. As chemical reactions slow down, any number of symptoms are likely to emerge. The situation is further complicated by the use of pharmaceutical medications, nearly all of which interfere with nutrient absorption or utilization.

It makes no sense to wait until the symptoms of nutritional deficiencies become fulminant. It's far more fascinating and exciting to discover how nutritional deficiencies and imbalances can cause a wide variety of otherwise inexplicable symptoms. *–JC*

Probiotic-Containing Drink Reduces Susceptibility to Illness and Sick Days

Consuming a daily beverage containing "probiotics" can greatly reduce your risk of developing respiratory and gastrointestinal infections. Probiotics, which often contain members of the *Lactobacillus* family of bacteria, help maintain a healthy digestive tract, fight disease-causing bacteria, and enhance the immune system.

The study was directed by Py Tubelius, MD, medical director for TetraPak, a Swedish manufacturing company. Tubelius and his colleagues asked 262 employees to consume either a daily beverage containing *Lactobacillus reuteri* or a placebo drink without the probiotic strain. The study lasted for almost three months.

Employees kept a diary and noted whether they developed respiratory or gastrointestinal symptoms or took sick leave.

Overall, only 11 percent of the workers taking the probiotic drink took sick leave, compared with 26 percent of those consuming placebo drinks.

The benefits were even better among night-shift workers. None of those consuming probiotics called in sick, compared with one-third of those drinking placebos. That's especially noteworthy because shift workers are generally more likely to develop illnesses.

Tubelius wrote that "sick days caused by respiratory or gastrointestinal diseases could be reduced by 55 percent by the use of *L. reuteri*..."

Lactobacillus strains of bacteria are commonly used in making yogurt and kefir, as well as various types of probiotic capsules.

Reference: Tubelius P, Stan V, Zachrisson A. Increasing work-place healthiness with the probiotic *Lactobacillus reuteri*: a randomized, double-blind placebo-controlled study. *Environmental Health: A Global Access Science Source*, 2005;4:25 epub: doi:10.1186/1476-069X-4-25. ❑

Low Vitamin C Levels Increase Risk of DNA Damage in Diabetics

Diabetic patients with low blood levels of vitamin C are more likely to suffer DNA damage, which may boost their risk of developing complications from the disease.

Diabetes has long been considered a disease that accelerates the aging process and leads to an earlier onset of heart disease and other disorders. High blood-sugar (glucose) levels increase free-radical damage, and DNA (the molecule that makes up genes) is one target of this damage.

Iris Benzie, DPhil, a clinical biochemistry professor at the Hong Kong Polytechnic University, and her colleagues studied fasting glucose levels glycated hemoglobin (HbA_{1c}), vitamin C levels, and DNA damage in 427 people with type 2 diabetes. HbA_{1c} provides an average blood-sugar level over six weeks and is a standard marker of good or poor "glycemic control."

Benzie found that DNA damage was directly related to higher fasting blood-sugar and HbA_{1c} levels, as well as to lower vitamin C levels. DNA damage was the greatest among people with low vitamin C levels, even when their blood-sugar and HbA_{1c} levels were similarly elevated.

Benzie wrote that "the finding of both hyperglycemia [high blood sugar] and low plasma ascorbic

acid [vitamin C] in a patient with type 2 diabetes mellitus may indicate particularly high risk of complications or act as an early warning signal of their onset."

She concluded by writing that "poorly controlled diabetic subjects might benefit from increased dietary vitamin C."

Reference: Choice SW, Benzie IF, Lam CS, et al. Interrelationships between DNA damage, ascorbic acid and glycaemic control in type 2 diabetes mellitus. *Diabetic Medicine*, 2005;22:1347-1353. ❑

Vitamin D Supplements Strengthen Bones, Increase Muscle Mass in Girls

Supplemental vitamin D significantly boosts bone-mineral density in girls, especially among those who have not yet reached puberty.

Ghada El-Jajj Fuleihan, MD, of the American University of Beirut Medical Center, Lebanon, and her colleagues asked 179 girls, ages 10-17 years old, to take one of two doses of vitamin D for 12 months. About half the girls took 1,400 IU of vitamin D once a week (equivalent to 200 IU daily), and the other girls took 14,000 IU (equivalent to 2,000 IU daily).

Fuleihan measured bone mineral density and content in the girls' lumbar spine, hip, forearm, and total body, as well as their overall body composition at the start of the study and after one year.

Girls taking either dose of vitamin D benefited greatly, though the higher dose led to slightly greater benefits. For example, lean muscle mass increased significantly in both groups, but slightly more in girls taking the higher dose of vitamin D. Similarly, bone-mineral content of the hips increased significantly more among girls taking high-dose vitamin D.

Prepubescent girls had the greatest benefits. Both doses of vitamin D led to significant increases in muscle mass and bone mineral density at several skeletal sites.

Reference: Fuleihan GE, Nabulsi M, Tamim H, et al. Effect of vitamin D replacement on musculoskeletal parameters in school children: a randomized controlled trial. *Journal of Clinical Endocrinology & Metabolism*, 2005:epub doi:10.1210/jc.2005-1436. ❑

Kiwi Antioxidants Have Benefits Similar to Those of Mild Heart Drugs

The unique combination of antioxidants in kiwi makes the fruit a potent heart tonic, according to a study by Korean researchers. In fact, kiwi acts very much like weak versions of several common heart drugs.

Kung-Ah Jung, PhD, a researcher at the Korea Food Research Institute, and colleagues bought kiwi at a grocery store, ground it up without its peel, then dissolved the fruit in either water or alcohol.

The effects of kiwi were similar whether the fruit was dissolved (for the experiments) in water or alcohol. Stronger concentrations of the fruit consistently had greater potency.

Kiwi had an ACE-inhibiting effect. Inhibiting the activity of ACE, or angiotensin-converting enzyme, is a common way that some drugs reduce blood pressure.

The fruit also inhibited the activity of the enzyme HMG-CoA reductase, the same mechanism statin drugs use to lower cholesterol levels. In addition, kiwi reduced fibrinolytic activity, which would lower the risk of blood clots.

The researchers attributed the benefits of kiwi to its rich concentration of vitamin C, carotenoids, and polyphenolic flavonoids.

Reference: Kung JA, Song TC, Han D, et al. Cardiovascular protective properties of kiwifruit extracts in vitro. *Biological & Pharmaceutical Bulletin*, 2005;28:1782-1785. ❑

Antioxidant in Green Tea May Slow Development of Alzheimer's Disease

The principal antioxidant in green tea can reduce the accumulation of amyloid beta protein in the brain, the chief characteristic of Alzheimer's disease.

The study, conducted by Kavon Rezai-Zadeh, PhD, of the University of South Florida, Tampa, focused on epigallocatechin-3-gallate (EGCG), which accounts for about one-third of green tea.

Rezai-Zadeh and colleagues injected EGCG into laboratory mice bred to develop the equivalent of Alzheimer's disease. EGCG led to a 54 percent decrease in the accumulation of amyloid beta protein and Alzheimer's-like plaque in the animals' brains.

People would need approximately 1,500 to 1,600 mg of EGCG daily to get an amount equivalent to what the mice received.

Reference: Rezai-Zadeh K, Shytle D, Sun N, et al. Green tea epigallocatechin-3-gallate (EGCG) modulates amyloid precursor protein cleavage and reduces cerebral amyloidosis in Alzheimer transgenic mice. *Journal of Neuroscience*, 2005;25:8807-8814. ❑

Cholesterol-Lowering Statins Impact CoQ10 Levels, But Questions Remain

Statin drugs, such as Lipitor, lower cholesterol levels by inhibiting a key enzyme involved in cholesterol production. The same enzyme is needed to manufacture coenzyme Q10 (CoQ10) a vitamin-like substance needed for energy production in heart and muscle cells.

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Quick Reviews of Recent Research

• Low vitamin may affect psychiatric disorder

Researchers studied folic acid levels in 23 patients with obsessive-compulsive disorder (OCD) and 23 healthy subjects. Folic acid levels were significantly lower and homocysteine levels higher in patients with OCD. In addition folic acid levels were strongly related to scores on a clinical test for OCD, with low folic acid levels being consistent with the most severe OCD. Folic acid is involved in the production of neurotransmitters, such as serotonin.

Atmaca M, et al. *Psychiatry and Clinical Neurosciences*, 2005;59:616-620.

• Fructose intake leads to gastrointestinal upset

Fructose consumption has increased substantially in the United States, largely because of the widespread use of high-fructose corn syrup as a sweetener. Researchers tested the effects of 25- and 50-gram doses of fructose on 15 healthy subjects. Half of the subjects showed signs of digestive problems after consuming 25 grams of fructose, and two-thirds had problems after the 50-gram dose. The researchers write that "fructose, in amounts commonly consumed, may result in mild gastrointestinal distress in normal people."

Beye PL, et al. *Journal of the American Dietetic Association*, 2005;105:1559-1566.

• Phytoestrogens may reduce lung cancer risk

Phytoestrogens, found in vegetables, have very weak estrogen-like effects. Researchers compared phytoestrogen intake in 1,674 people with lung cancer and 1,735 healthy subjects. Overall, people with the highest intake of phytoestrogens had a 46 percent lower risk of lung cancer. Men seemed to benefit more than women did.

Schabath MB, et al. *JAMA*, 2005;294:1493-1504.

• More evidence that vitamin D prevents falls

Researchers treated 96 elderly women who had suffered strokes and residual paralysis with either 1,000 IU of vitamin D or placebos for two years. At the beginning of the study, all patients were deficient in vitamin D. Supplementation with vitamin D led to a 59 percent reduction in falls. Four hip fractures occurred in women taking placebos, but none among those taking vitamin D. In addition, the number and size of muscles improved, as did muscle strength, among women taking vitamin D.

Sato Y, et el. *Cerebrovascular Diseases*, 2005; 20:187-192.

• Low zinc levels may reduce energy levels

Researchers placed 14 young men on a low-zinc diet for nine weeks, followed by supplemental zinc for an equal period of time. When the men were on the low-zinc diet, their peak oxygen uptake and carbon dioxide output decreased significantly, affecting their exercise performance. Activity of the enzyme carbonic anhydrase, which depends on zinc, decreased. Carbonic anhydrase helps the body remove carbon dioxide, and exercise places a greater demand on this enzyme.

Lukaski HC. *American Journal of Clinical Nutrition*, 2005;81:1045-1051.

CoQ10 and Statin Drugs...

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Reduced CoQ10 levels may be a factor in muscle weakness and liver disease in some patients taking statins. Conceivably, long-term statin use might even set the stage for heart failure.

In a recent study, Costanza Lamperti, MD of the University of Milan, Italy, studied some of the consequences of statins in 18 patients. Eight of the patients had both weakness and myalgia, four had only weakness, three had only myalgia, and others had reported muscle cramps.

"We found decreased muscle CoQ10 concentration in 10 patients (56 percent), but the decrease was slight in seven patients (70 percent) and severe in only three patients (30 percent)," wrote Lamperti. Two patients had signs of impaired mitochondria, the part of cells where CoQ10 functions.

"Although these data do not support a pathogenic role of CoQ10 deficiency in statin drug-related myopathy, it may be prudent to advocate that patients with statin drug-related myopathy be given oral CoQ10 supplementation," Lamperti added.

The researchers did not report how long the patients had been taken statins. A longer period of use might have a greater effect on CoQ10 levels.

Reference: Lamperti C, Naini AB, Lucchini V, et al. Muscle coenzyme Q10 level in statin-related myopathy. *Archives of Neurology*, 2005;62:1709-1712. ❑

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