The Nutrition Reporter™

© Jack Challem June 2011 Vol 22 No 6

The independent newsletter that reports vitamin, mineral, and food therapies

Supplemental Resveratrol Improves Blood Sugar and Insulin in Diabetics

A new study has found that relatively low supplemental doses of resveratrol, an antioxidant found in red wine, can lead to improvements in insulin function and glucose tolerance.

Resveratrol (pronounced *res-vair-uh-traul*) has attracted considerable attention over the past several years because it activates the Sirt1 gene, which increases longevity in some species. However, a beneficial dose of resveratrol has not been clear – some studies have found that about 350 mg daily can have a beneficial effect, whereas other research points to many times this amount.

Istvan Wittman, MD, PhD, of the University of Pécs, Hungary, and his colleagues enrolled 19 middle-age men with type 2 diabetes in a double-blind study. Ten of the men received 5 mg of resveratrol twice daily, and nine were given placebos for four weeks. By the end of the study, men taking the resveratrol supplements had significant improvements in glucose control, compared with their status at the beginning of the study and those who had been taking placebos.

First, men taking resveratrol benefited from slower post-meal increases in blood sugar – what the Wittman and his colleagues called the time to maximum glucose levels.

Second, men taking resveratrol had a decrease in insulin resistance, another sign of improved glucose tolerance. Wittman used a test known as HOMA-IR (homeostasis model assessment for insulin resistance), which calculates glucose tolerance based on the combined measurement of fasting glucose and fasting insulin. Resveratrol supplements led to a 1.5 point decrease in HOMA-IR. In contrast, men taking placebos had a slight increase in HOMA-IR.

Third, an analysis of platelet blood cells from the subjects found that resveratrol led to an increase in phosphorylated protein kinase B, which plays an important role in normal insulin function and helps cells use blood sugar.

Previous animal research at Harvard University found that supplemental resveratrol protected mice against developing type 2 diabetes. In a small unpublished drug company study, resveratrol supplements reduced fasting blood sugar levels and improved insulin function in men with type 2 diabetes.

Most resveratrol supplements now come from Japanese knotweed (*Polygonum cuspidatum*), a particularly rich source of the antioxidant.

Reference: Brasnyo P, Molnar GA, Mohas M, et al. Resveratrol improves insulin sensitivity, reduces oxidative stress and activates the Akt pathway in type 2 diabetic patients. *British Journal of Nutrition*, 2011: doi 10.1017/S0007114511000316. ❑

Perspectives

Artificial Colors and Children

In the 1970s, Benjamin Feingold, MD, made the argument that artificial food colors caused or exacerbated attention-deficient hyperactivity disorder (ADHD) in children. His work helped many children, but subsequent scientifically controlled studies yielded conflicting results.

Recently, the Food and Drug Administration decided to again review the evidence linking artificial colors and other synthetic food additives to mood, cognitive, and behavior changes in children. Maybe this time the FDA will conclude that a link exists. I won't hold my breath.

Sometimes scientific reductionism has its limitations – reductionism is a process of seeing the trees, but not the forest. In this case, the health hazard may not just be the artificial colors and other food additives, which contribute to food appearance but not to its nutritional value.

The question I raise is about what else is in – or not in – the foods along with artificial additives. Nearly all of the foods containing these additives are highly processed junk foods, such as candies, soft

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drinks, cereals, cookies, and cakes. They're mostly sugars and refined carbohydrates (typically wheat), and they often contain trans fats. These fake foods contribute to blood-sugar problems, which in turn can set the stage for poorer brain function. These foods are almost always low in vitamins and minerals – and adding a few vitamins to sugary, processed wheat or corn flakes doesn't count as good nutrition.

So it's really important to not just look at artificial additives in the foods children eat. It's essential that we weigh the combined effect of all the questionable ingredients in foods fed to children at home, at school, and in restaurants. It's also crucial to consider whether the nutritional content of these foods supports a healthy mind and body or whether it provides less than optimal nutritional value and actually interferes with health. *–JC*

Huge Increase in Soybean Oil Consumption Affects Omega-3s

Our traditional diet contained approximately the same amounts of omega-6 fats – which often promote inflammation – and anti-inflammatory omega-3 fats. But over the past 100 years, dietary changes have led to significant increases in the consumption of omega-6s and decreases in omega-3s. By some estimates, people now consume 16 to 30 times more omega-6s, priming people for inflammatory diseases.

But what specific dietary changes account for this dramatic change?

According to a new study by Joseph R. Hibbeln, MD, of the U. S. National Institutes of Health, people now consume *1,000 times* more soybean oil than they did a century ago. Soybean oil is particularly rich in linoleic acid (LA), the parent molecule of omega-6 fats, which displaces and lowers tissue concentrations of omega-3 fats, such as eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA).

Hibbeln and his colleagues compared the fat content of foods commonly eaten in 1909 and 1999. LA intake, mostly from soybean oil, increased by two and one-half times, from 2.79% to 7.21% of calories consumed during this time.

The overall ratio of omega-6s to omega-3s in the diet from 1909 to 1999 increased by 77%, which would boost the pro-inflammatory effect of the diet. High tissue levels of LA depress EPA and DHA levels through several mechanisms.

Citing other research, Hibbeln wrote, "The LA [omega-6] content of mature breast milk from American women increased from 6% to 7% of total fatty acids to 15% to 16% of total fatty acids between 1945 and 1995, whereas the LA content of adipose tissue increased from ~6% in 1960 to 18% in 1986."

Hibbeln also noted, "During the 20th century, there was a shift in production away from small, family owned farms to industrial-scale agribusiness operations. Foods produced and consumed in the early 20th century (e.g., meats and fats derived from pastured animals) had different essential fatty acid compositions than modern grain-fed poultry and livestock products."

Reference: Blasbalg TL, Hibbeln JR, Ramsden CE, et al. Changes in consumption of omega-3 and omega-6 fatty acids in the United States during the 20th century. *American Journal of Clinical Nutrition*, 2011;93:950-962. ❑

Omega-3s and Nuts Reduce Risk of Death from Inflammation

High intake of omega-3 fats, as well as nuts, significantly reduces the risk of death from inflammatory diseases, according to a new study by Australian researchers.

Paul Mitchell, MD, PhD, of the University of Sidney, and his colleagues analyzed the diets and health of 2,514 men and women over 14 years. All of the participants were at least 49 years old when the study began.

Over those 14 years, 214 of the subjects died from inflammatory diseases. These diseases included infections; blood and immune disorders; endocrine, nutritional, and metabolic diseases; respiratory system disorders, digestive disease, and musculoskeletal and connective-tissue disorders. Heart diseases and cancers were excluded because they have both inflammatory and noninflammatory causes and would have skewed the data in favor of death from inflammatory diseases.

Women with the highest intake of omega-3s were 44% less likely to die from an inflammatory disease. In both women and men, high intake of alpha-linolenic acid (the parent molecule of omega-3s) was associated with a 17% reduction in inflammatory-related mortality.

In addition, the consumption of nuts was associated with a 32% to 51% decrease in inflammatory disease mortality. Mitchell wrote that "several bioactive components present in nuts may account for this beneficial effect."

Reference: Gopinath B, Buyken AE, Flood VM, et al. Consumption of polyunsaturated fatty acids, fish, and nuts and risk of inflammatory disease mortality. *American Journal of Clinical Nutrition*, 2011: doi 10.3945/ajcn.110.009977. ❑

Green Tea and L-Theanine Improve Brain and Mood

Two new studies show significant cognitive benefits from green tea and the amino acid L-theanine, which is found in the tea.

Seok Seon Rho, MD, of the Cheongju Medical Center, Korea, and colleagues treated 91 men and women with mild cognitive impairment, a common prelude to Alzheimer's disease. Forty-five of the subjects received 1,680 mg of a combination of green tea extract and L-theanine daily for 16 weeks, and 44 people received placebos.

Tests found that people taking the supplement had significant improvements in memory and attention and marginal improvements in recognition.

In addition, brain wave measurements were conducted on 24 of the subjects. These tests found increases in brain theta waves, which indicate improved cognitive alertness.

In the other study, Akiko Higashiyama, PhD, of the University of Shiga Prefecture, Japan, and her colleagues used supplemental L-theanine to treat 18 university students. The students were divided into two groups, those with high and low anxiety levels.

All of the students received 100 mg of L-theanine in a glass of water or a placebo (only water) during the study.

Tests found that L-theanine led to improvements in students with higher anxiety levels. They had increased brain alpha-wave activity, which is associated with relaxation and mental focus, as well as better attention, lower heart rate, and faster reaction times.

Reference: Higashiyama A, Htay HH, Ozeki M, et al. Effects of L-theanine on attention and reaction time response. *Journal of Functional Foods*, 2011: doi 10.1016/j.jff.2011.03.009. ❑

Prenatal Omega-3s Benefit Children's Bodies and Minds

Pregnant women who consume ample amounts of fish or take omega-3 supplements give birth to children who are less prone to obesity and are more likely to have better brain development, according to two new studies.

The biologically active constituents of fish oils – eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) – are necessary for normal brain and eye development during fetal growth.

Emily Oken, MD, MPH, of the Harvard Medical School, and her colleagues investigated whether the ratio of omega-6 to omega-3 fats in pregnant women had any influence on the risk of obesity in their children. They measured the midpregnancy intake of omega-6 and omega-3 fats in 1,120 women, the blood plasma concentrations in 227 pregnant women, and the umbilical cord amounts of these fats in 302 women.

The omega-6 fats, which are generally pro-inflammatory, are found in most cooking oils and many processed foods. The omega-3 fats come mostly from fatty coldwater fish, such as salmon, and grass-fed beef.

At age three, almost 10 percent of the women's children were obese.

Women who consumed a high ratio – that is, a high proportion – of omega-6 fats to omega-3 fats were more likely to have an obese child by age three. In contrast, women who consumed ample amounts of omega-3 fats were 32% less likely to have an obese child at age three.

Only about one in five women consumed more than two fish meals each week, and only half of them consumed 200 mg of DHA daily. Only 3% of the pregnant women consumed 200 mg of DHA daily during the last several weeks of pregnancy.

In a separate study, Cristina Campoy, MD, PhD, of the University of Granada, Spain, and her colleagues asked 315 women to take one of several supplement regimens from the 20th week of their pregnancy until delivery. The supplements consisted of fish oils (500 mg DHA and 150 mg EPA), 400 mcg of folate, both supplements, or placebos.

At delivery, the researchers measured the DHA level in umbilical cord blood.

Campoy and her colleagues then assessed the neurological development of the children at ages four and five and one-half. They found that higher DHA levels in unbilical cord blood at birth were associated with better performance on neurological tests at age five and one-half.

References: Donahue SM, Rifas-Shiman SL, Gold DR, et al. Prenatal fatty acid status and child adiposity at age 3 y: results from a US pregnancy cohort. *American Journal of Clinical Nutrition*, 2011;93:780-788. Escolano-Margarit MV, Ramos R, Beyer J, et al. Prenatal DHA status and neurological outcome in children at age 5.5 years are positively associated. *Journal of Nutrition*, 2011: doi 10.3945/jn.110.129635. ❑

Breakfast Reduces Appetite, Maintains Normal Glucose

Eating breakfast does make a difference in terms of not overeating later in the day. Conversely, skipping breakfast leads to greater food consumption and may contribute to overweight.

Nerys M. Astbury, PhD, of the University of Nottingham, United Kingdom, and her colleagues studied the responses of 12 healthy men of normal body

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Quick Reviews of Recent Research

• Probiotics ease gastrointestinal bloating

Researchers at the University of North Carolina, Chapel Hill, tested a combination of Lactobacillus and Bifidobacterium strains of probiotics (good bacteria) on people with bowel disorders and bloating. Thirty-one subjects received the probiotics and 29 received placebos twice daily for eight weeks. People taking probiotics had a 15% reduction in bloating symptoms compared with the beginning of the study. Compared with the placebo group, people taking probiotics had a 27% reduction in bloating.

Ringel Y. *Journal of Clinical Gastroenterology*, 2011: epub ahead of print.

• L-glutamine helps with glucose tolerance

Australian researchers noted that the amino acid L-glutamine stimulates the secretion of glucagon-like peptide, which may be impaired in insulin resistance and type 2 diabetes. They tested the effects of 15 and 30 grams of L-glutamine, along with the drug sitagliptin by itself or in combination with the lower dose of L-glutamine. The 30-gram dose of supplemental L-glutamine yielded better overall responses among the 15 type 2 diabetic patients in the study, compared with the lower dose and the drug. L-glutamine reduced the postprandial (post-meal) rise in glucose, improved postprandial insulin, and improved the activity of glucagon-like peptide.

Samocha-Bonet D. *Journal of Nutrition*, 2011: doi 10.3945/jn.111.139824.

• Sugary drinks boost type 2 diabetes risk

Harvard University researchers analyzed the relationship between sugar-sweetened beverages (soft drinks, fruit punches, lemonades, and fruit drinks) among 2,680 subjects over 20 years of follow up. After adjusting for cofounding influences, sugary beverages increased the risk of type 2 diabetes by 24 percent. The consumption of artificially sweetened beverages by themselves was not a factor in diabetes risk.

de Koning L. *American Journal of Clinical Nutrition*, 2011; 93:1321-1327.

• High-protein diet better for weight loss

Researchers in New Zealand placed 83 overweight or obese women on either a moderately high-protein diet or a high-fiber relatively high-carbohydrate diet for eight weeks. The moderately high-protein diet contained 30% protein and 40% carbohydrate, whereas the high-fiber diet contained 20% protein and 50% carbohydrate. Women on both diets lost weight, but those on the higher protein diet had greater benefits. Women eating more protein lost 9.9 pounds, compared with 7.26 pounds on the high-fiber diet. Women eating more protein lost 8.8 pounds of body fat, compared with 5.5 pounds on the high-fiber diet.

Te Morenga LA. *Nutrition Journal*, 2011;10: doi 10.1186/1475-2891-10-40.

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weight. In one phase of the study, the men ate a cereal breakfast with skim milk, and in the other phase they did not eat breakfast.

Two and one-half hours after eating breakfast, the men were given a 13.5 ounce (400 mL) beverage containing protein, carbohydrate, and fat. The men also consumed the beverage mid-morning when they skipped breakfast.

At lunch, the men were served a pasta meal with tomato sauce and cheese.

When the men skipped breakfast, they had higher blood sugar and insulin responses to the beverage, compared with when they ate breakfast beforehand. Higher blood sugar and insulin responses would point to abnormal glucose tolerance.

When the men ate breakfast, they consumed 17% less food at lunch.

"Regularly eating breakfast is recommended as one of the strategies that may help individuals achieve and maintain healthy body weight," Astbury and her colleagues wrote. "Despite this advice, the proportion of people who report regularly consuming breakfast is declining, which has coincided with the dramatic increase in overweight and obesity."

They added that breakfast skippers often snack more between meals.

Reference: Astbury NM, Taylor MA, Macdonald IA. Breakfast consumption affects appetite, energy intake, and metabolic and endocrine responses to foods consumed later in the day in male habitual breakfast eaters. *Journal of Nutrition*, 2011: doi 10.3945/jn.110.128645. ❑

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The Nutrition Reporter™
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