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Adult Onset Diabetes

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Precautions

Dietary modifications and supplementation often improve high blood pressure, high blood fats, and high blood sugars characteristic of diabetes. Failure to monitor these changes and adjust medications accordingly may result in low blood sugars, low blood pressure, or other undesirable consequences.

The Diabetes Epidemic

A number of theories have been put forward to explain diabetic deterioration. The free radical postulate suggests that oxygen derived free radicals damage the circulatory system and the eyes of diabetics leading to atherosclerosis and cataracts. Diabetics are known to have higher levels of oxidized fats in their bodies and lower levels of antioxidants. Lower levels of antioxidants are also associated with the disease complications.

The glycation postulate suggests that sugars irreversibly bind with proteins at increased rates in the body of diabetics. Elevated blood sugars push the glycation process. Once proteins are fused with sugars they can not function normally. Glycated proteins can damage the kidneys, circulatory system and other tissues.

Glycated proteins can deteriorate into advanced glycation end products (AGE's). Not only can these be formed within the body as a result of uncontrolled blood sugars, but we can also ingest them with foods. When foods containing protein and sugars are heated to high temperatures, glycated proteins and AGE's form. This is common with crackers, breakfast cereals and meats. Whether formed inside the body or ingested in the diet, glycation products cause damage and can create complications for the diabetic.

A third postulate is that of sorbitol accumulation. Glucose increases the synthesis of sorbitol within cells. Sorbitol passes through cell membranes only with great difficulty. Accumulation can cause cells to swell, function poorly, and even die. Sorbitol accumulation appears to be involved in damage to the eyes (cataract and retinopathy) and nerves (neuropathy) of diabetics.

The ascorbate postulate suggests that both vitamin C and glucose have the same transport in the body. High blood sugars impair the transport of vitamin C within the body leading to a form of scurvy at specific tissue sites.

The more uncontrolled the blood sugars, the less room there is on the bus to transport vitamin C to various tissues throughout the body. Vitamin C has a dual function of working as an antioxidant and also strengthening the connective tissue. Vitamin C also helps prevent sorbitol accumulation.

These postulates are not mutually exclusive and all probably contribute to the diabetic condition to a greater or lesser degree.

Reference:

Gaby, Alan, *Nutritional Medicine*, Concord, NH; Fritz Perlberg Publishing, 2011, 1081-1082.

Pollution

Bisphenol A is a compound used to make plastics and resins. It is commonly found on the inside of food and beverage containers and is known to leach from these containers into foods and beverages with heating or storage. BPA is found in the urine of 95% of urine samples of people in the United States.

Administration of tiny quantities of BPA to mice for 4 days causes elevated insulin levels and altered tolerance of glucose. Urinary excretion of BPA is associated with increased risk of diabetes in a dose dependent manner.

A further study found that other persistent organic pollutants appear to increase the risk of diabetes in a rather dramatic manner as well. Researchers

measured the levels of 6 common pollutants (eg. PCB's, dioxins, chlordane) present in 80% of the study population. The 10% of the population group with the highest levels of these pollutants had a 38-fold increased risk of diabetes over the 25% of the study group with the lowest levels of the pollutants in their blood. The researchers suggested that these pollutants caused insulin resistance, a hallmark of adult onset diabetes.

Of particular note in this study was that obesity did not appear to be a risk factor for diabetes among members of the study group with undetectable levels of pollutants in their blood. Many of these pollutants have an affinity for fat so when an individual is fat the fat serves as a storage depot for the toxins. Obesity was associated with diabetes when individuals were above the 25th percentile in pollutant accumulation.

It is important to understand causative factors in evaluation of health problems in order to be able to properly target interventions.

Levels of these toxins can be reduced by eating more organic foods and reducing the intake of polluted animal products. Levels of fat loving toxins can also be reduced by exercise to sweat out toxins and by supplementing with a non-contaminated fat.

Salmon Oil Plus is an excellent oil for this purpose. It is tested for over 250 pollutants with a standard of none detectable. In addition, the oils are of such a high quality that they can avidly displace contaminated fat in the body.

References:

Alonso-Magdalena, P., et al., The estrogenic effect of bisphenol A disrupts pancreatic beta-cell function in vivo and induces insulin resistance. *Environ Health Perspec*t 2006;114:106-112.

Lee, D.H., et al., A strong dose-response relation between serum concentrations of persistent organic pollutants and diabetes: results from the National Health and Examination Survey 1999-2002. *Diabetes Care* 2006;29:1638-1644.

Sugar Intake

Intake of both sucrose and fructose has been implicated in the development of diabetes. Consumption of sucrose as opposed to starch significantly elevates both blood glucose and fasting insulin levels. The Nurses Health Study II found that consumption of one or more sugar sweetened soft drinks per day increased risk of diabetes 32% over women who consumed less than one of these drinks per month. Consumption of sugar sweetened fruit punch also increased diabetic risk.

It should be noted that Health Canada's Bureau of Chemical Safety found bisphenol A in 85% of 72 canned soft drinks sold in Canadian stores. The same is probably true in the United States.

Fructose may be even more of a risk for the development of diabetes than sucrose. The intake of fructose has increased from about half a pound a year in 1970 to over 62 pounds in 1997. The increased incidence of diabetes has followed the increased intake of fructose.

The risk of fructose is dose related. The ingestion of modest amounts has little adverse effect on glycemic control in diabetics. Conversely, large amounts produced insulin resistance in as little as 6 days. However, long-term feeding studies of rats with modest fructose intake do result in impaired glucose tolerance.

Fruits and vegetables contain relatively small amounts of fructose which are unlikely to create any problems for the diabetic. The high antioxidant content of these foods is actually beneficial.

Fructose loads, as in high fructose sweetened soft drinks, should be avoided. Both sucrose and fructose ingested in this form have been shown to damage the eyes of laboratory animals.

Reference:

Gaby, Alan, *Nutritional Medicine*, Concord, NH; Fritz Perlberg Publishing, 2011, 1084.

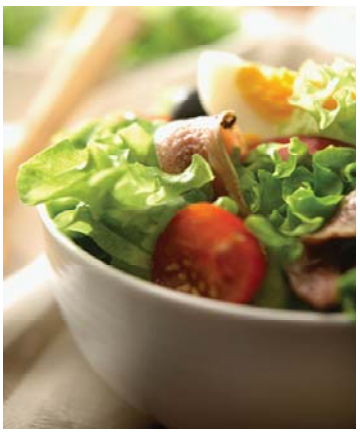
Johnson, Richard J., and Gower, Timothy, *The Sugar Fix*, New York, NY: Rodale Press, 2008.

http://www.enviroblog.org/2009/03/health-canada-finds-bpa-in-most-soft-drinks-highest-levels-in-energy-d.html, Enviroblog, March 8, 2009.

Fiber and Raw Foods

Dr. John Douglas fed 32 patients with 62% of their calories from raw foods for 6.7 months. Blood pressure dropped 17.8 mm Hg, and there was an average of 3.8 Kg of weight loss. Each kilogram is 2.2 pounds. In addition, four out of five of his patients spontaneously quit smoking or drinking. Douglas found that diabetics could often reduce or eliminate their diabetic medications by increasing the percentage of raw foods in the diet.

Raw foods are often easier to digest than cooked foods. William Philpott demonstrated that difficulty digesting foods and allergic responses to foods could result in blood sugar elevations. When he supplemented his patients who had diabetic tendencies with digestive aids such as hydrochloric acid and pancreatic enzymes, the elevation



of blood sugars following ingestion of foods which were poorly tolerated disappeared or was minimized.

Many patients with type 2 diabetes have been able to reduce or eliminate anti-diabetes medication after increasing intake of fiber and complex carbohydrates. This is particularly true for those who are overweight.

Fiber exists in soluble and insoluble forms. Soluble fibers form a gel which slows the absorption of sugars and carbohydrates. Soluble fibers are more effective at improving blood sugar control than are insoluble fibers.

Insoluble fibers are found in foods like whole wheat bread and bran. Soluble fibers are found in legumes, artichokes, carrots, and fruits like strawberries, grapefruit, and peaches.

The benefit of fiber intake is dose related. Optimal intake is over 35 grams a day. The greater the percentage of soluble fibers the better. Ma and Griffith found an inverse association between fiber intake and levels of C-reactive protein, a marker for increased risk of diabetes and heart disease.

The form in which carbohydrates are ingested makes a difference as well. Grinding grains into smaller pieces speeds the absorption of the carbohydrates. Thus ground rice or wheat is absorbed more rapidly than the whole grains making it more difficult to control blood sugars. Highly processed foods cause much more rapid deterioration of blood sugar than whole foods. Vegan diets have also been shown to be helpful for weight loss in studies with diabetics.

REFERENCES:

Douglas, J., et al., Effects of a raw food diet on hypertension and obesity, *South Med J*, 1985; 78(7); 841.

Philpott, William, *Victory Over Diabetes*, New Canaan, CT: Keats Publishing, 1983.

Ma Y, Griffith JA, et al, Association between dietary fiber and serum C-reactive protein, *Am J Clin Nutr*, 2006; 83(4): 760-6.

NUTRIENTS

Glucose Tolerance Factor

Chromium improves the functioning of insulin in the body and decreases the requirement for insulin. Chromium has been shown in human trials to improve blood sugar control in diabetics. Chromium also improves measurement of heart function in those with blood sugar abnormalities and prevents cardiovascular disease in animal models.

One study found that the chromium in the toenails of healthy individuals was .71 mcg/g, .61 in subjects with diabetes without complications, and .52 in diabetics with obvious heart disease.

Chromium in nature is found in the form of Glucose Tolerance Factor. This is actually a nutrient complex which includes niacin. Gaby suggests that chromium given apart from niacin may be ineffective.

REFERENCES:

Anderson, R.A., Chromium, Diabetes Mellitus, and Lipid Metabolism, *Journal of The American College of Nutrition*, October 1992;11(5):607.

Rajpathak S, Rimm EB, et al, Lower Toenail Chromium in Men With Diabetes and Cardiovascular Disease Compared With Healthy Men, *Diabetes Care*, September 2004;27(9):2211-2216.

Gaby, Alan, *Nutritional Medicine*, Concord, Nh: Fritz Perlberg Publishing, 2011, 1089.

Biotin

Biotin activates an enzyme which enables glucose to be used within the cells. Studies have shown that the nutrient improves blood sugar control. Biotin may also help prevent the development of diabetic neuropathy.

REFERENCES:

Albarracin CA, Fuqua BC, et al, Chromium picolinate and biotin combination improves glucose metabolism in treated, uncontrolled overweight to obese patients with type 2 diabetes, *Diabetes Metab Res Rev*, 2008; 24(1): 41-51.

Vitamin B6 or Pyridoxine

A large body of research confirms the ability of vitamin B6 to improve glucose tolerance and protect the pancreas. Diabetics often have reduced levels of vitamin B6 in blood measurements. Supplementation of diabetic men with vitamin B6 improved blood parameters even though their levels of vitamin B6 appeared normal. This writer believes that most diabetics will benefit from supplementing with the entire B complex in a natural form.

REFERENCE:

Rogers, Kenneth S. and Mohan, Chandra, Vitamin B6 Metabolism and Diabetes" *Biochemical Medicine and Metabiologic Biology*, 1994;52:10-17.

Magnesium

Magnesium is one of the most important nutrients for the diabetic. Magnesium deficiency is a common finding when looked for. Supplementation with vitamin B6 can increase a magnesium deficiency interfering with the beneficial results of using that supplement.

Fasting blood insulin levels are inversely related to magnesium status and those with diabetes have significantly lower magnesium levels than those without the disease. Low magnesium also appears to contribute to the deterioration of the cardiovascular system when one suffers with diabetes.

Both copper and zinc deficiencies may aggravate diabetes. Supplementation with modest amounts of both may be beneficial.

Associations of Serum and Dietary Magnesium With Cardiovascular Disease, Hypertension, Diabetes, Insulin and Carotid Artery Wall Thickness. *Journal of Clinical Epidemiology*, 1995;48:927-940.

Seelig, M.S., et al, Low Magnesium: A Common Denominator in Pathologic Process in Diabetes Mellitus, Cardiovascular Disease and Eclampsia, *Journal of the American College of Nutrition*, October 1992;11(5):608.

Gaby, Alan, *Nutritional Medicine*, Concord, Nh: Fritz Perlberg Publishing, 2011, 1093.

Antioxidants

Vitamin C

Vitamin C is a priority antioxidant

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for the diabetic because vitamin C and glucose have the same transport mechanism. As a consequence, high blood sugars can result in localized scurvy as the body looses the ability to transport vitamin C to specific areas in the body.

In one study of type 2 diabetics supplementation with 1,000 mg of vitamin C for 6 weeks significantly reduced fasting blood glucose, triglycerides, LDL cholesterol, serum insulin, and glycated hemoglobin (HbA1C). Interestingly, subjects supplemented with 500 mg/day of vitamin C did not show any significant benefits proving that dosage really does matter. Remember that the recommended intake for vitamin C is below 200 mg/day in the United States.

Vitamin C can also reduce sorbitol accumulation and capillary fragility, both of which are common among diabetics. The inclusion of flavonoids with the vitamin C supplementation is important for preventing the capillary fragility.

REFERENCES:

Afkhami-Ardekani M, Shojaoddiny-Ardekani A, et al, Effect of vitamin C on blood glucose, serum lipids & serum insulin in type 2 diabetes patients, *Indian J Med Res*, 2007; 126(5): 471-4.

Cunningham, John, "Vitamin C" An Aldose Reductase Inhibitor That Normalizes Erythrocyte Sorbitol in Insulin-Dependent Diabetes Mellitus, *J Am Col Nutr*, 1994;13(4):344-350.

Vitamin D

A report by Janet Raloff in 2004 suggested that increasing blood measurements of vitamin D from 35 nmol/l to 75 nmol/l (or essentially doubling vitamin D blood levels) improved insulin sensitivity by 60% "which is a greater increase than many anti-diabetes drugs provide." A blood vitamin D level of 40 is usually considered optimal.

REFERENCE:

Raloff, Janet, Vitamin D: What's Enough? Many People Need Much More, *Science News*, October 16, 2004, Vol. 166, p. 248.

Vitamin A

Diabetics are compromised in their ability to convert carotenoids to vitamin A. As a consequence the presence of signs of vitamin A deficiency such as the formation of calluses on the feet is often diagnostic for diabetes.

REFERENCES:

Altschule, Mark D., *Nutritional Factors in General Medicine*, Springfield, Illinois: Charles C. Thomas, 1978, pp. 90-93.

Salmon Oil

Omega-3 fatty acids have been shown to improve diabetic neuropathy with long term usage. They also appear to reduce the risk of cardiovascular deterioration in diabetes.

Okuda, Y., et al, Long term effects of eicosapentaenoic acid on diabetic peripheral neuropathy and serum lipids in patients with type II and diabetes mellitus, *J Diab Comp* 1996; 10:280-287.

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