Wheat Allergy and Introduction of Wheat

Early exposure to solid foods in infancy has long been associated with the development of allergy. Clinicians at the University of Denver assessed the association between timing of cereal-grain exposures (wheat, barley, rye, oats) in the infant diet and development of wheat allergy (11). They collected data on 1,612 children enrolled from birth to approximately 5 years of age. Development of wheat allergy and other questionnaire data along with dietary exposures were obtained at 3, 6, 9, 15, and 24 months and annually thereafter. (Children with celiac disease autoimmunity detected by tissue transglutaminase autoantibodies were excluded.) Children who were identified by the questionnaires as having wheat allergies were then further tested to determine wheat-specific immunoglobulin E levels. Over the course of the study, 16 children (1%) reported wheat allergy. All four children with detectable wheat-specific immunoglobulin E were first exposed to cereal grains after 6 months. Thus, in this study, those children who were first exposed to cereals after 6 months of age had an increased risk of wheat allergy compared with children first exposed to cereals before 6 months of age. A first-degree relative with asthma, eczema, or hives was also independently associated with an increased risk of wheat-allergy development. Contrary to popular belief that delaying initial exposure to cereal grains until after 6 months of age decreases wheat allergy, this practice actually may increase the risk of developing wheat allergy.

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High-Fiber, Whole Grain, Low-Fat Diet Patterns Continue to Control Weight and Prevent Chronic Disease

Several different types of studies have been published recently on carbohydrates and fiber in the diet. Despite their difference in methodology, subjects, and other aspects, these studies reaffirm the benefits of diets high in fiber and low in fat for weight control and prevention of disease.

One large epidemiological study looked at weight change and diet in the Potsdam cohort of 24,958 middle-aged men and women, which is an arm of the European Prospective Investigation into Cancer and Nutrition (EPIC) study (12). In this study, the food pattern with a high consumption of whole-grain bread, fruits, fruit juices, grain flakes/cereals, and raw vegetables and a low consumption of processed meat, butter, high-fat cheese, margarine, and meat predicted the lowest mean annual weight gain over a 4-year follow-up period. In other words, subjects scoring high for the pattern maintained their weight or gained significantly less weight over time compared with subjects with an opposite pattern. However, the prediction of annual weight change by the food pattern was significant only in non-obese subjects.

In a French study that had a cross-sectional design, fiber was shown to be important for reducing the risk of being overweight. In this study of over 6,000 men and women, those ingesting the highest intakes of total dietary fiber and nonsoluble dietary fiber had a significantly lower risk of being overweight and an increased waist-to-hip ratio (6). In addition, those eating higher dietary fiber had better markers for chronic disease including lower blood pressure, plasma apolipoprotein (apo) B, apo B:apo A-I, cholesterol, triacylglycerols, and homocysteine.

What was an important finding is that different fibers did not have the same beneficial effects.

1. Fiber from cereals was associated with lower body mass index, blood pressure, and homocysteine concentration.
2. Fiber from vegetables was associated with lower blood pressure and homocysteine concentration.
3. Fiber from fruit was associated with a lower waist-to-hip ratio and blood pressure.
4. Fiber from dried fruit or nuts and seeds was associated with lower body mass index, waist-to-hip ratio, and fasting apo B and glucose concentrations.
5. Fiber from pulses had no specific effect, and soluble dietary fiber appeared to be less effective than insoluble fiber.

The authors concluded that dietary fiber intake is inversely correlated with several cardiovascular disease risk factors in both sexes. Furthermore, they recommended increased consumption and the inclusion of fiber from many types.

In the Finnish Diabetes Prevention Study, high-fiber, low-fat diets were found to be more effective in sustaining weight loss over a 3-year period than were high-fat, low-fiber diets. In this cohort of more than 500 overweight, middle-aged men and women with impaired glucose tolerance, the average weight loss in both groups was not dramatic, with 3.1 kg in the low-fat group and 0.7 kg in the high-fat group. Nevertheless, the hazard ratio (HR) for diabetes incidence was 0.38 for those in the quartile ingesting the most fiber compared with those ingesting the least fiber in this cohort (9). The HR for those ingesting the most fat was 2.14 and 1.73 for those ingesting the most saturated fat. Compared with the low-fat/high-fiber category, the HR was 1.98 for low-fat/low-fiber, 2.68 for high-fat/high-fiber, and 1.89 for high-fat/low-fiber. These data seem to indicate that diets low in fat and high in dietary fiber as suggested by long-term traditional dietary advice be more helpful with sustained weight reduction and decreased progression to type II diabetes even in high-risk subjects.

A small study in the United States used a randomized crossover design followed 23 normal-weight, 8 overweight, and 8 obese men and women (aged 25–36 years) on diets controlled for calories and composition (3). Actual energy expenditure was measured by indirect calorimetry on day 15 of each diet type. Carbohydrate balance on the high carbohydrate diet was highly and significantly correlated. On this diet, the subjects who had a higher positive carbohydrate balance gained significantly less fat mass, percent body fat, and weight over time. When adjusted for levels of serum insulin, carbohydrate balance remained a significant predictor of changes in fat mass and percentage body fat. These data do not support the idea about low insulin levels as the reason that some diets are purported to cause weight loss but do support the long-held view that high carbohydrate diets help reduce weight gain.

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Specific Isolated Fibers Offer Specific Benefits

Type II diabetics who regularly ingested psyllium husk fiber twice a day had lower fasting blood glucose, glycosylated hemoglobin (HbA1C), and LDL/HDL ratio, and increased HDL cholesterol (14). This 8-week randomized, double-blind, placebo-controlled study involving 49 subjects with type II diabetes were either given 5.1 g dose of psyllium husk fiber twice a day just prior to the morning and evening meal or a placebo. Both groups continued to take their antidiabetic medications and were given diet counseling prior to the study. Those subjects in the psyllium husk group experienced significant reductions in fasting blood glucose, HbA1C, and LDL/HDL ratio, while HDL cholesterol was found to increase significantly. In addition, subjects in the psyllium group reported better gastric tolerance to metformin (their antidiabetes medication). No serious adverse events were reported in either group, and both the psyllium husk fiber and the placebo appeared to be well tolerated. The results of this randomized-controlled trial suggest that subjects with type II diabetes may benefit from daily supplementation with psyllium husk fiber.

In a study with 26 healthy, young subjects, fibers from flax and psyllium increased fecal weight, fecal bulking capacity, and improved glycemic response. However, consumption of a proprietary flax fiber supplement (9.0 g/day) for 2 weeks increased fecal bulking capacity 2.9 g of fecal weight per gram of fiber with flax. The psyllium supplement (10.4 g/day) increased fecal bulking capacity 4.8 g of fecal weight per gram of fiber with psyllium (2). The second part of the study compared the glycemic response of 11 fasting subjects ingesting white bread and bread with added flax. Trials with each bread type were repeated over four test periods using strict conditions of glycemic testing conditions. Compared with white bread, consumption of bread with flax lowered peak blood glucose from 6.9 versus 6.6 mmol/L and the integrated area under the curve from 693 versus 669. The authors suggested that their results indicated that supplementation with flax, either as an oral supplement or baked into a bakery product, may provide benefits for laxation and improved glycemic response.

Protein and Specific Amino Acids May Be Useful in Promoting Satiety and Weight Loss in Rats

Inclusion of L-leucine may be a useful strategy for planning diets that help fight against obesity if the studies done in rats show the same effects in humans (13). When L-leucine was injected into the hypothalamus of rats, the animals ate less. In fact, the researchers found that L-leucine (1.1 µg in 2 µl of a phosphate-buffered saline solution) caused a decrease in food intake that began 4 hr after administration and lasted an entire day. The link between leucine and weight loss has been reported in the literature earlier this year in humans (7).

L-Leucine is thought to affect satiety through an already identified signaling pathway, mammalian Target of Rapamycin (mTOR). This pathway has been previously linked to the development of diabetes and cancer and may play a key role in food intake by signaling stored and available energy in our body. The pathway appears to activate mTOR in the hypothalamus. It still needs to be confirmed that physiological levels of the amino acid change concentrations in the hypothalamus and influence energy balance and metabolism. It is also not known if adding leucine to the diet will have an impact (5). Interestingly, similar results were not observed when similar branched chain amino acids like L-valine were used.

In a different study, rats were fed diets with a lowered carbohydrate-to-fat ratio (10). This diet, with elevated protein, reduced the development of white adipose tissue, weight gain, body fat mass, and adipocyte size. The reductions in adipose tissue development because of decreases in the ratio of the diet seemed to be due primarily to reduced hepatic lipogenesis as measured by reduced levels of lipogenic enzymes including including fatty acid synthase and lipoprotein lipase in both adipose tissue and liver.

Dietary Carbohydrates—The Quality May Matter

The association between measures of dietary carbohydrate intake and cataracts in nondiabetic persons was recently studied using a food-frequency questionnaire in the Age-Related Eye Disease Study (AREDS) (1). Dietary glycemic index was associated with a higher prevalence of lens opacity in the cohort of 3,377 men and women aged 60–80 years. The odds ratio (OR) for lens abnormality comparing the highest with the lowest quartile of carbohydrate intake was 1.27 for cortical opacities of any severity (>0% of area opaque). Results from the cross-sectional analysis of AREDS baseline data suggest that dietary glycemic quality and dietary carbohydrate quantity may be associated with prevalent nuclear and cortical opacities, respectively.

More Magnesium, Less Copper Could Benefit Health

Higher serum levels of magnesium were linked to a lower risk of all-cause mortality in the Paris Prospective Study 2 (8). In this cohort of over 4,000 men aged between 30 and 60 at the start of the 18-year study, those who had the highest serum level of magnesium (0.85 mmol/liter or more) compared with the lowest level (0.76 mm/liter or less) had a 40% reduction in the risk of all-cause mortality, 50% reduction in death from cancer, and 40% reduction in the risk of cardiovascular disease. Those with the highest serum levels of copper (16.4 µmol/liter or more) were more likely to have high cholesterol and to smoke. They were linked to a 50% increase in all-cause mortality, 40% increase for cancer mortality, and a 30% increase in cardiovascular disease (CVD) deaths compared with those with the lowest serum levels (13.5 µmol/liter or less). There were also some important interactions: low serum zinc and high serum copper and low serum zinc and low serum magnesium were associated with increased mortality. In contrast, high serum levels of both copper and zinc were associated with increased risk of death from all-causes.

All of these minerals are involved in the immune system, the inflammatory response, and the oxidative damage. The minerals, especially magnesium and zinc, are cofactors for numerous enzymes and have been shown to bolster the immune system and reduce inflammatory markers. Excess copper is associated with reduced immune function and lower antioxidant status.

The study did not look at dietary intake so it is unknown if the levels were due to low intakes or were markers of disease. However, low intakes may contribute to poor serum levels. It is important to point out that dietary surveys in many different populations show that a significant portion fails to ingest the recommended levels of magnesium and zinc. For the cereal chemist, it is important to know that whole grains and nuts are sources of magnesium and zinc. Efforts must be made to continue advocating more whole grain intake and to devise processing techniques that help to make these bioavailable.

EFSA Assesses New Aspartame Study and Reconfirms Its Safety

A panel of the European Food Safety Authority (EFSA) has once again evaluated the safety of aspartame in light of the recently published long-term study on the carcinogenicity of aspartame conducted by the European Ramazzini Foundation in Bologna, Italy (4). The panel evaluated all the evidence currently available and announced that there is no need to further review the safety of aspartame. They also affirmed that there was no reason to revise the previously established acceptable daily intake (ADI) for aspartame (40 mg/kg of body weight). The panel also noted that intakes of aspartame in Europe, with levels as much as 10 mg/kg of body weight per day, are well below the ADI. The pronouncement is the latest in continuing safety reviews occurring for more than 20 years in many countries throughout the world. Despite this recent affirmation and other reviews with similar results about its safety, there continues to be concerns raised in popular

websites, some with dubious credentials, and by animal studies that fed very high doses. The most recent study that sparked the review in 2005 by the European Ramazzini Foundation was a long-term study in rats. The authors of this study reported that their results indicated that aspartame can cause cancer and called for the reevaluation of the current guidelines on the use and consumption of the sweetener. EFSA immediately took up the charge to reevaluate. The panel carefully evaluated the extensive data from the new study and the other existing data as well. ESFA noted that the latest study used more animals per dose group and used a larger number of doses than did conventional carcinogenicity studies and that these made the findings carry more weight. Despite this, there were still aspects of the study that introduced confounding information. Notably, there was a high background incidence of disease observed in all the animal groups including controls that did not receive aspartame. The slight increase in incidence of lymphomas and leukemias in treated rats was considered to be unrelated to aspartame treatment and most likely attributed to the high background incidence of inflammatory changes in the lung. In addition, there was no dose-response relationship with respect to increasing doses of aspartame. The findings in the kidney, ureter, and bladder, observed mainly in female rats, are not specific to aspartame and have been observed with a number of chemicals administered to rats at high dose levels. Such changes are normally the result of irritation or imbalances in calcium metabolism specific to rats and are of no relevance for humans. For other tumors, the numbers of tumors were low and there was no clear dose-response over a wide dose range. Furthermore, there was uncertainty about the diagnosis of these tumors. Thus, the panel concluded that on the basis of all the available data to date there is no reason to further review the previous scientific opinion on the safety of aspartame nor to revise the ADI for aspartame of 40 mg/kg of body weight.

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