



*This newsletter is written in honor of Annemarie Colbin, PhD (1940-2015), founder of the Natural Gourmet Institute, author of Food and Healing (1986), and mentor to many people in the field of food and nutrition. Among her pioneering ideas, Annemarie recognized how systems theory from the field of physics applies to foods—the concept that whole foods as systems ideally support our own bodies as systems. In the 1970s and 1980s, when the food industry was pushing fractured foods such as refined flour, refined vegetable oils, and high fructose corn syrup because they were cheap and had a long shelf life, Annemarie’s counter-cultural message advocating the health-supportive role of whole foods was an important one. As she noted, “The pendulum can swing only so far...” and in part through her voice, a chorus of others, and the legacy she left behind, we witness today a reawakened interest in whole foods/whole grains and the role that they play in supporting good nutrition and health.*

*In similar spirit, I want to recognize my friend Ali Berlow, founder of Island Grown Initiative, and her new book, A Food Advocate’s Handbook (2015). Ali wrote this “how to” inspirational guide to outline the many ways in which we can support the whole foods movement by advocating, collaborating, and educating to build sustainable food systems in our own local areas.*

## **Summer 2015: Traditional Whole Grains For Good Health and the Prevention of Chronic Disease**

Many people today avoid bread, grains and grain-based products due to fears of gluten, weight-gain, and/or environmental pollutants such as arsenic, a carcinogen sometimes found in rice. Avoiding grains is understandable if we consider that the majority of grains we consume today are refined, often genetically engineered, and linked to intolerances and chronic disease. But, omitting grains from our diet means we can miss out on the many vital nutrients and health benefits that traditional whole grains have long provided to support and sustain cultures throughout time.

In writing this newsletter, I hope to contribute to your understanding of refined grains and the way that science and innovation have rapidly altered traditional grains, stretching our adaptive capabilities beyond their limits to increase the likelihood of chronic disease. I would also like to discuss the important roles that traditional whole grains play in supporting good health and nutrition.

Above all, I want to inspire you to emphasize whole grains in your diet if you do not already do so. Scientific studies suggest that traditional whole grains significantly reduce the risk of cardiovascular disease, diabetes, cancer, gastrointestinal issues, AND obesity.<sup>1</sup> Interestingly, too, of all the plant foods that we consume, only grains provide all the macronutrients—proteins, carbohydrates, and fats—as well as vitamins, minerals, and fiber required to sustain life. [As evidence of the nutrition packed into whole grains, many prisoners in World War II were able to survive on a simple diet composed only of whole-grain bread and water.]

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<sup>1</sup> According to repeated scientific studies, whole grains support stable weight and reduce the risk of diabetes by as much as 30%; stroke by more than 30%; and heart disease by 25% or more.

Whole grains are complete. *A traditional whole grain is a powerful, integrated holistic system, a complex web of macro- and micronutrients, antioxidants, and phyto-chemicals that work together synergistically to sustain good health. In addition, when eaten with fruits and vegetables, the phyto-chemicals in whole grains work in similar synergistic fashion with the nutrients in fruits and vegetables to support well being.*

Part of the power and health-supportive nature of traditional whole grains relates to the life force energy and variety of nutrients that are programmed into every kernel, something nature designed to support the life of a new plant. For centuries, whether eaten as whole kernels or ground into flour to make bread, civilizations consumed grains in their whole form, with the germ, bran, and endosperm eaten in the same proportions present in the intact kernel of the plant.

For traditional cultures, whole grains represented not only nutritious energy but also security and power. A single grain of rice, for example, could in three years multiply exponentially to yield 10,000 new grains, the equivalent of seven tons of rice!<sup>2</sup> Rice was a sacred grain worshipped in Asia for its power to provide energy and satisfy hunger, just as wheat and corn were in the Americas.

Today, in times of greater “calorie security,” traditional whole grains are still important to support health: Because they are loaded with B-vitamins, whole grains are ideally suited to help us sustain mental focus and cope with a modern lifestyle that is marked by information overload. The rich complement of B vitamins in whole grains also fosters a sense of mental well being and helps us deal with the stresses inherent in our fast-changing world.

### **Refined Grains, Genetically Modified Grains, and High Fructose Corn Syrup in an Evolutionary Context**

To appreciate whole grains, let’s first consider how in the short space of recent decades the food industry and science have fractured and genetically altered grains. As in past times, grains still account for the majority of calories consumed by people in most parts of the world, but today the majority of grains are consumed in fractured form. This is true whether we are talking wheat, the major grain of the United States and Russia; rice, the staple grain of India, China, and Japan; or the maize and rice of Central and South America.

As suggested earlier, refined flour as we know it today is a relatively new phenomenon. White flour dates to the roller mill, which was developed in Hungary in the late 1860s and early 1870s and soon replaced the grist mill. Unlike grist mills that invariably left behind some particles of the whole grain’s fibrous bran and perishable germ, the roller mill was able to grind grains to easily separate the bran and germ from the starchy endosperm to produce a true white flour.

Refined flour, with its long shelf life, helped launch the modern food industry while it also answered the preference of individuals for light, “fluffy” bread and bakery products. With the roller mill, the 100-year interval between the 1870s and 1970s brought about a major shift in demand from whole to refined grains, whether as refined flour for home baking or as bakery products created in endless innovative ways by the food industry.

In contrast to the centuries-old traditional whole grain diet of our forebears, today the typical American consumes 6-7 servings of grains a day, of which 5-6 servings are refined grain products. Bread accounts for slightly more than a quarter (26%) of all grains we eat, followed by pizza (11%), grain-based desserts (10%), tacos/tortillas/burritos (8%), pasta (7%), and chips and crackers (7%). Surprisingly, ready-to-eat

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<sup>2</sup> Christian Elwell, South River Miso.

cereals, which take up voluminous shelf space in super markets, account for less than 3% of all grains Americans consume.<sup>3</sup> Of course, we also ingest grains in the form of high-fructose sweetened drinks (and indirectly through grain-fed poultry, beef, lamb, pork, and fish).

With regard to the health-related implications of this shift to refined grain products, the human body metabolizes refined flour even faster than sugar, a factor that creates blood sugar spikes, and with time can lead to insulin resistance, diabetes and other chronic disease. In addition, by refining out not only taste but also the complementary nutritional cofactors located in the bran and germ, consuming refined grains forces the body to tap into its own precious mineral stores (think osteoporosis, for one) to provide the missing cofactors needed to digest and assimilate refined grains.

As noted above, most grains that we consume today are in the form of prepared and packaged foods. Many of the grains used in these food products are not only refined, but also genetically manipulated. Through genetic engineering, science has developed hybrid, high-yield varieties of corn and wheat that dominate our diet in a myriad of ways:

In the short space of the last 45 years or so, scientists developed “dwarf wheat” and high fructose corn syrup (HFCS). Dwarf wheat is a new hybrid variety of high-yield, elastic, high-gluten wheat designed to withstand the industrial processes involved in making modern factory bread. Dwarf wheat causes gluten problems for many people. During this same 45-year period, science and industry developed a processed grain product, HFCS as a cheaper alternative to sugar. HFCS is largely derived from genetically modified corn; it spikes blood sugar in more extreme fashion than table sugar; and, HFCS contributes to weight gain in a greater way than table sugar. HFCS is linked more strongly to diabetes, obesity, and chronic disease than refined flour or table sugar.

In an evolutionary context, traditional whole grains entered the human diet as a staple with the advent of agriculture about 10,000 years ago and for the last 3,000-4,000 years, grains have been a major component of the human diet.<sup>4</sup> Along the expansive continuum of evolutionary time, genetically engineered corn, dwarf wheat, and HFCS are *very* new.

Why is this important? Because grains, our major dietary staple, have been altered too rapidly and in ways that are too extreme to allow our bodies to comfortably adapt. We see evidence of this in the major increase of chronic disease in our modern world. Diabetes is a vivid example: It is estimated that one-third of all Caucasians and one half of all Blacks, Hispanics, Native Americans and Asians born after 2000 will develop diabetes. It appears that given their genetic makeup, these latter groups have an extremely difficult time adapting to refined flour, GMO grains, and their derivative products.

In summary, refined white flour is a problem. Genetic engineering of grains like corn and wheat for high yields and to resist pesticides is a problem. And, HFCS as a major sweetener in foods and soft drinks is also a problem. These push the body beyond its adaptive limits and create inflammation that can lead to chronic disease.

Thankfully, in recent years, more governmental, academic, and other non-profit groups have started to encourage people to increase their consumption of whole grains. In 2000, the USDA issued a special recommendation suggesting that individuals consume at least three 16-gram whole grain servings a day. While only 5% of all Americans meet this guideline, this message appears to be gradually taking hold.

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<sup>3</sup> National Cancer Institute.

<sup>4</sup> GA Spiller, “Whole Grains, Whole Wheat, and White Flours in History,” in *Whole-Grain Foods in Health and Disease*.

More Americans are demanding whole grains, and the food industry is now marketing and labeling to capitalize on this trend: We see more bread and boxed cereals prominently, and often deceptively, displaying the “whole grain” label, as individuals purchase more “whole grain” products with each passing year.

### **The Anatomy of a Whole Grain and the “Whole Grain” Labeling Problem**

A whole grain is composed of three major parts, the germ, bran and endosperm all encased in a protective outer husk. The *germ*, the vital essence of the grain but only a small portion of its volume, contains the embryo, the life force of the plant. The germ contains vitamins, minerals, and some fat and protein. The *bran*, the outer layers of the grain that protects the delicate germ against water, pests, sunlight, and bacteria, provides vitamins, minerals, fiber, and organic compounds that defend against pathogens and parasites. The starchy *endosperm*, the basis of refined white flour, is the largest part of the grain, and its role is to provide food for the seedling. While mostly starch, the endosperm also contains some protein, vitamins, and minerals.

Unfortunately, a legitimate “whole grain” and what the United States allows the food industry to call a “whole grain” are not one in the same. The American Association of Cereal Chemists uses a strict definition, a whole grain being the “intact, ground, cracked or flaked fruit of the grain whose principal components, the starchy endosperm, germ and bran, are present in the same relative proportions as they exist in the intact grain.” In contrast, the United States allows the food industry to label products “whole grain” as long as they contain at least 51% whole grain flour by weight as well as 1.7% dietary fiber. When purchasing “whole grain” products, read labels carefully to get a better sense of the true ingredients, since food companies are required to list ingredient in descending order of importance.

### **Whole Grain Nutrients and Compounds Work in Synergy as a System to Prevent Disease**

A whole grain contains B-vitamins (thiamin, niacin, riboflavin, and pantothenic acid), minerals (calcium, magnesium, potassium, phosphorus, sodium, and iron), amino acids, and vitamin E-rich oils. Whole grains are also packed with a complex network of health-supportive phytochemicals, lignans, phytosterols, and a variety of other protective compounds. Most of these vital compounds are located in the bran and germ.

Hundreds of scientific studies have been written that document the link between specific plant nutrients, fiber, and non-nutrient plant compounds and the prevention of specific chronic diseases. Fortunately, much of this scientific research is summarized and readily accessible in two thorough contemporary reports, one by the American Society of Nutrition (ASN), “Putting the Whole Grain Puzzle Together: Health Benefits Associated with Whole Grains; and, the other, “Whole Grains and Human Health” by Joanne Slavin, of the Dept. of Food Science and Nutrition, University of Minnesota.

These two reports confirm that whole grains contain a broad array of health-supportive factors, including vitamins, minerals, antioxidants, phyto-chemicals, dietary fiber, resistant starch, oligosaccharides, trace minerals, phenolic compounds, phytates, and phyto-estrogens, including lignans, plant stanols, and sterols. And, both reports state the key point that I would like you to take away, namely, that the extensive list of ingredients in a whole grain work together synergistically as a system and in multiple ways to help prevent a variety of chronic diseases. These include cardio-vascular disease, diabetes, obesity, and cancer; whole grains also support gastrointestinal health...

“The additive synergistic effects of... bioactive phytochemicals found in whole grains may be responsible for the health benefits associated with whole grains.” (ASN)

“The essential macro- and micronutrients along with phytonutrients present in whole grains synergistically contribute to their beneficial effects.” (ASN)

“Other compounds in grains, including antioxidants, phytic acid, lectins, phenolic compounds, amylase inhibitors, and saponins have all been shown to alter risk factors for CHD. It is probable that the combination of compounds in grains, rather than any one component, explains their protective effect in CHD.” (Slavin)

“The synergistic effect of several whole grain components, such as phytochemicals, vitamin E, Mg, or other, may be involved in the reduction of the risk for type 2 DM [diabetes].” (Slavin)

Beyond the science, what fascinates me most about traditional whole grains is their spiritual quality and the rather magical life force energy that is held in timeless suspension, a treasure of life potential, held in each tiny grain. Science, by pointing to the intricacies and interplays of nutrients packed into a traditional whole grain, can give us every reason to be as much in awe of whole grains as our forebears were, when they intuitively sensed this.

### **Rotating Grains for a Wide Complement of Nutrients and to Avoid (Man-Made) Health Problems**

Whole grains vary in the amount of calories, protein, fat, carbohydrate, and fiber that they provide for a given weight serving. Of the seven major grains—wheat, oats, barley, brown rice, maize, rye, and millet—oats rank highest in calories, protein, and fats; brown rice is highest in carbohydrates, and (hulled) barley tops other grains in fiber content. On the other end of the spectrum, of the seven major grains, brown rice is lowest in both protein and fiber; rye is lowest in fat; and oats are lowest in carbohydrate.

The major grains eaten in the United States are wheat, corn, oats, barley, and rice, with wheat accounting for two-thirds to three-quarters of the grains we consume on a daily basis. The recent increase in gluten intolerance relates at least in part to the major role that wheat plays in our diet, as well as to the introduction only several decades ago of high-gluten dwarf wheat that is now the dominant wheat used by the food industry. Chemicals and pesticides are another reason to rotate grains, especially for people who emphasize brown rice in their diet: Much of the rice grown in the United States contains arsenic (rice readily absorbs arsenic residues left behind in the soil) from the days when cotton growers used arsenic as a pesticide against the boll weevil. [I plan to write about rice and arsenic in a future newsletter.]

It is easy to eat the same grains out of habit, but for balanced nutrition and to avoid gluten intolerance and arsenic (affecting brown rice), try to rotate grains. Have fun experimenting with whole grains that may be new to you. (For recipes, see the books listed in Reading Resources, p.6)

### **Chew Well**

Chew well, especially when eating grains. Grains and other carbohydrates need to be ground well and mixed with the enzymes in saliva to begin the process of carbohydrate digestion. If swallowed too quickly, carbohydrates miss this important stage of digestion. They then sit in the stomach as proteins and fats are broken down, later moving to the lower digestive tract where carbohydrate digestion again resumes in earnest. Too little chewing can result in incomplete digestion, discomfort, and flatulence. [Chewing food 25-30 times before swallowing is also one of the most effective ways to lose/maintain a healthy weight.]

### **Whole Grain Reawakening?**

Nutrition, texture, and taste are inseparable partners. This is an important principle because the more whole grains we consume, the more our taste preferences will shift to favor whole grains over refined, empty ones. Of all American consumers today, 95% do not meet the government's whole-grain, three-servings/day guideline. So, yes, we have a ways to go, but every time we choose whole grains over refined grain products, we school our taste buds to prefer the taste and texture of whole grains over the empty calories and empty feeling conveyed by refined products. It's a habit worth striving for.

### **Reading Resources:**

#### **Articles:**

Adon KK, Sorrels ME, Liu RH, "Phytochemicals and antioxidant activity of milled fractions of different wheat varieties," (2005).

Jonnalagadda SS, Harnack L, Liu RH, McKeown N, Seal C, Liu S, & Fahey G, "Putting the Whole Grain Puzzle Together: Health Benefits Associated with Whole Grains—Summary of American Society for Nutrition 2010 Satellite Symposium" (2010).

Liu RH, "Potential Synergy of Phytochemicals in Cancer Prevention: Mechanism of Action," (2004).

Okarter N & Liu RH, "Health Benefits of Whole Grain Phytochemical," (2010).

Slavin, J, "Whole Grains and Human Health" (2004).

Spiller, GA, "Whole Grains, Whole Wheat, and White Flours in History," (2002)

Zavala, YJ & Duxbury, JM, "Arsenic in Rice: Estimating Normal Levels of Total Arsenic in Rice Grain" (2008).

#### **Books:**

Barbara Grunes and Virginia Van Vynckt, *Waves of Grain*

Joanne Saltzman, *Amazing Grains*

Maria Speck, *Ancient Grains for Modern Meals*

Rebecca Wood, *The Splendid Grain*

#### **Reliable Sources of Whole Grain Flour:**

Anson Mills, [www.ansonmills.com](http://www.ansonmills.com)

Giusto's Bakery & Flour Mills, [www.giustos.com](http://www.giustos.com)

King Arthur Flour, [www.kingarthurfLOUR.com](http://www.kingarthurfLOUR.com)

The Union Square Greenmarket Grain Initiative, [www.grownyc.org/greenmarket/manhattan](http://www.grownyc.org/greenmarket/manhattan)