

FUNCTIONAL FOODS

Come of Age

Two thousand years ago, Hippocrates said, “Let your food be your medicine, and your medicine be your food.” Was he anticipating the advent of functional foods? And, will functional foods follow the difficult path supplements are now experiencing?

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Functional foods and nutraceuticals are redefining the boundaries between what is defined as a food, drug and dietary supplement, and how all these are being used to maintain health. Functional foods have become a top U.S. food industry research and development priority.

What are the implications for the traditional supplement industry that is buffeted by bad press, ephedra notoriety and renewed government scrutiny? Can it ride out the onslaught of big food business as it usurps its traditional mission, namely, the delivery of specific nutrition via pills and powders?

Here is a look at the evolution of attitudes toward food’s role in health maintenance and disease prevention. When did the food industry get into the act? Is it in it to stay? And, how is the supplement industry to react and recover its footing?

Touting Health

The Institute of Medicine (Washington) defined functional foods in 1995 as: any modified food or food ingredient that may produce a health benefit beyond the



Americans’ attitude toward food has changed remarkably in the last century—from a view that it was only a source of fuel to current awareness of its disease-preventing potential.

traditional nutrients it contains. This definition was improved to include: foods that have a positive impact on health, physical performance or mental well-being over and above their intrinsic nutritional value.

Although people have always felt food performs a function beyond hunger satiation, “knowledge” was absent in many food beliefs.

Freed of British rule in 1783, Americans retained the British culinary tradition for another century. However, while British staples such as pork and molasses were popular, Americans distinguished themselves by consuming much larger quantities than their British forbearers. The colonists did not take advantage of the richness of local flora and fauna. They turned their backs on most new local foods until some—such as potatoes, tomatoes and corn—found acceptance in Europe and were re-imported to the New World.

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Diet is a contributing factor in at least four of the 10 leading causes of death. A central premise of the functional food revolution is that the risk of disease can be mitigated by dietary measures.

By the mid-19th century, the human body was viewed as an engine. Food was seen as the body's fuel, and it did not differentiate between various substances. In 1860, *Ladies Home Magazine* summed up the conventional wisdom by stating "the most useful articles of diet are the commonest" and what mattered was the mass of food ingested, which varied according to individual sex, size and profession. Thus, a woman needed 20oz. of food per day, whereas a prizefighter needed 36oz. per day.

Science and Pseudoscience

Following work by the German scientist Justus von Liebig between 1840 and 1850, researchers began to separate foods into proteins, carbohydrates, fat, minerals and water. The "New Nutrition" movement was born and soon gave rise to its own faddish falsehoods. In attempting to bring benefits of the new science to the lower classes, Americans were urged to eat more white flour and fewer potatoes because the former was a much cheaper source of carbohydrates. Wheat bran and potato skins were to be discarded as refuse. Tomatoes had no nutritional value. If one insisted on eating green vegetables, they were to be boiled to death to make them easier to digest.

From the 1890s through the early 20th century, various forms of vegetarianism arose. Known as the Golden Age of food faddism, raw foodists, fruitarians, nutarians and lacto-ovarians each touted the merits of their respective obsession. Meat eaters had their own ax to grind, such as the Salisbury all-meat diet. Uniformly, advocates of these drastic dietary recommendations attested to their efficacy via personal experience or other anecdotal evidence. Sound familiar?

However, in 1867, von Liebig concocted what is perhaps the first true functional food, baby formula in powder form. The product attempted to replicate the then-known nutrients in mother's milk. By the end of the 1890s, Nestlé's (Vevey, Switzerland) "Best for Babies" powdered milk was being manufactured and distributed by a New York City firm. Unfortunately, by 1898, it became evident that babies fed proprietary foods and condensed milk had higher mortality rates than babies who were breast-fed. Again, bad science led to bad and dangerous products.

Birth of the Vitamin Age

Elmer McCollum, a pioneer of New Nutrition ideology and a leader in the discovery of vitamins, was able to prove that illness could result from the absence of certain elements. This was a radically different nutritional approach. For the first time, dietary deficiency diseases could be directly related to the absence of specific vitamins in the diet. Beriberi and scurvy, due to a lack of vitamins B1 and C, are cases in point.

From 1915 to 1930, a number of vitamins were isolated. However, methods of synthesizing them were not discov-

Surviving the Onslaught

Manufacturers of supplements face several obstacles in trying to gain consumer confidence.

- **Over-capacity:** Severe competition exists among companies manufacturing undifferentiated products.
- **Consumer confusion:** The consumer is incapable of differentiating between different products and different product claims.
- **Mislabeled products:** Products have gained notoriety for not delivering advertised nutrition.
- **High visibility quackery:** Operators have made extravagant, unsubstantiated claims, everything from curing the common cold to cancer.
- **Bad press:** Media has highlighted the bad apples in the supplement industry and played up the few adverse conditions reported for some products (e.g., ephedra).
- **Legislative scrutiny:** Press coverage and ensuing consumer outcry has prompted legislator action, further curtailing industry growth.

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ered until later. Hence, the only way in which they could be obtained was by eating suitable foodstuff. The inability to properly assess the quantity of vitamins in foods (the analytical methods were not available until the 1930s) made it impossible to recommend how much of a specific kind of food should be consumed. One result was that some food advertisers made extravagant claims. Manufacturers had a field day, with many tiptoeing on the borderline of dangerous misinformation.

By the late 1920s, studies revealed that processing tended to deprive food of some vitamins and minerals. Manufacturers began to fund research to add nutrients to their products. Additionally, frantic research took place at universities to establish links between vitamins and disease, particularly cancer. By the time of the Great Depression, the basic idea that vitamins and minerals are essential to growth, protect good health and even prolong life was prevalent in middle-class America.

Supplements: A New Industry is Born

Fast-forward to the 1960s, when renewed concerns over health, coupled with the new counter culture among the young, inaugurated what has been called the "Golden Age of Food Quackery." As in the 1920s, the hope that vitamins were miracle cures for afflictions ranging from cancer to the common cold, coupled with the ability to mass-produce vitamins, resulted in the supplement industry's explosive growth. By 1986, surveys indicated that shoppers cited vitamin/mineral content as a factor in determining what foods to buy over any other consideration.

In the U.S., the functional food revolution was given its first tentative boost, though it was a decade premature, when Kellogg (Battle Creek, Mich.) promoted its All-Bran cereal in October 1984. Consumers were informed that a high-fiber, low-fat diet could reduce the risk of developing certain cancers. Kellogg had its claim reviewed by the National Cancer Institute (Washington) but not by the FDA. This led to an explosion of health- and disease-related claims, as manufacturers entered the competitive



Cereals have been at the forefront of functional foods. In 1984, Kellogg's (Battle Creek, Mich.) All-Bran was among the first, and the trend was seen recently in General Mills' (Minneapolis) launch of a heart-healthy Honey Nut Cheerios.

whether the pharmaceutical or food industry would lead in this area. The term "nutraceutical" suggests a relationship between supplementation and pharmaceuticals. The pharmaceutical industry has distribution, capital resources and credibility due to perceived seriousness and commitment to research and testing. However, it also is spoiled by high margins, ostensibly to offset high R&D and clinical trial costs. A commitment to functional foods required the pharmaceutical industry to enter the world of food, where margins are very low. Hence, with the exception of a few companies positioned at the edge of pharmaceuticals, such as Ross Abbott Labs (Columbus, Ohio) and Mead Johnson (Evanston, Ind.), the field remains wide open to the food industry, an industry with several advantages of its own.

For example, people must eat food. Hence, if a food has the added value of being "extra good for you," there is little consumer resistance to overcome. Foods often effectively mask offensive tastes or odors of a supplement. With a huge arsenal of spices and flavor ingredients, it becomes easier to hide a few grams of an off-tasting element in a food product weighing 100g to 500g.

Food companies have powerful marketing and distribution in place. Diet is a contributing factor in at least four of

fray. *The New York Times* reported that in the first half of 1989, 40% of new food products included a health claim.

The past few years, however, have been disastrous for the supplement industry. Supplement makers and marketers have been battered by a variety of factors. See chart "Surviving the Onslaught."

As consumers become more sophisticated and nutritionally literate, they start to question the numbing claims made by competing marketers stretching truth for the sake of sales. Gone are the days when consumers accept—at face value—the nutritional advice dispensed by a sober 16-year-old in a traditional health food store.

The Food Industry Steps In

It is not surprising that food companies have taken the lead in functional food marketing. A while ago, it was debated

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■ www.agr.gc.ca/misb/fb-ba/nutra/index_e.php —

Agriculture and Agri-Food Canada's site on functional foods

■ www.cfsan.fda.gov/label.html — FDA's Food Labeling and Nutrition site

■ www.jafra.gr.jp/nakagawa-e2.html — Interview on Japanese FOSHU functional foods

the 10 leading causes of death: heart disease, some cancers, cerebrovascular disease and diabetes mellitus. A central premise of the functional food revolution is that the risk of disease can be mitigated by dietary measures. The functional food industry thrives on this risk.

Also, the industry is applying serious R&D dollars to create new opportunities. The FDA has been reluctant to allow companies to promote foods using the structure-function claims that have been used to market dietary supplements. This has slowed the pace of functional food introductions. However, strong R&D is slowly breaking down the barriers.

GRAS status has been obtained for cholesterol-lowering phytosterols. Following a number of studies attesting to the effectiveness of tea flavonoids in fighting heart disease and cancer, a supplier started production of pure epigallocatechin gallate (EGCG), the active component in green tea. The Belgian company Belovo (Bastogne) has introduced Christopher® eggs into the U.S. market, with more than 17 times the omega-3 fatty acid content of regular eggs (or more than 600mg omega-3 per egg). The Canadian dairy company Natrel (Markham, Ontario) launched Natrel Omega-3, a new flaxseed oil-enriched milk designed to contribute to a healthy diet and help in the prevention of cardiovascular disease.

Whereas most of the functional foods to date have dealt with issues of health maintenance and disease prevention, increasing attention is being focused on products that address medical conditions.

Delivering Nutrition

In July 2000, the General Accounting Office (GAO, Washington), the investigative arm of Congress, raised concerns regarding potential safety issues of functional foods and the questionable state of government regulations. In essence, the GAO report says dietary supplement regulations, when applied to conventional foods (such as nutrition bars), blur the boundary between foods and supplements.

At the same time, the Center for Science in the Public Interest (CSPI, Washington), a consumer pressure group, asked the FDA to halt the sale of 75 functional

food products. According to CSPI, these products were sold with false and misleading claims.

Where have we heard this before? Similar accusations leveled at the supplement industry caused a significant consumer backlash. To this day, the supplement industry struggles to recover its earlier status.

So, are functional foods the flavor of the month buzzword? The answer appears to be a resounding "no." Under different labels, functional foods have been around for hundreds of years. And, if the rumblings from the research labs are any indication, we will be seeing extraordinary new functional food products in the coming years.

The nutrition industry can greatly assist the growth of the functional food segment. The food industry has little experience or patience in dealing with regulatory issues, even for food additives, let alone functional foods and nutraceuticals. With its high consumer profile, food marketers are bound to generate far greater scrutiny than the fragmented supplement industry. In view of the regulatory climate, and the lessons learned from recent history, the food giants will proceed with caution. This is where the nutrition industry can make its contribution. Ingredient and/supplement suppliers who have already laid the groundwork with good science will continue to seek out and establish relationships with food marketers. **NS**

Many resources were used in the preparation of this article. Especially useful were Revolution at the Table and Paradox of Plenty, by Harvey Levenstein, and The Functional Foods Revolution by Michael Heasman and Julian Mellenten.



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