

The Rising Tide of Functional Foods & Beverages

By Peter Leighton

Functional foods & beverages have demonstrated not only their staying power as a new category of products, but they have actually been driving growth in the food industry. As might be expected, this open floodgate of opportunity has drown many and driven others into the rocks, as the swift currents have not been well understood by all who have ventured into the waters.

The global market for functional foods & beverages will reach \$176.7 billion in 2013 with a CAGR of over 7%. Beverages lead the category, growing at a rate of 10.8%, with foods increasing at 6.9%. Euromonitor looks at fortified/functional products as a \$246 billion segment of health and wellness-positioned packaged



foods and beverages, equaling about one third of the category. Between 2007-2012 this segment showed a 42% sales increase (compared to 29% achieved by organic products and 28% registered by the better-for-you category), and functional foods & beverages now comprise

about five percent of the overall US food market, which is stagnant in comparison at about 1-3% annual growth.

It's important to understand the currents fueling this wave of growth. From a macro perspective, consumers have progressed from looking at food as simply caloric intake for survival, and then as a taste experience to drive satiety, towards

a view of food as a platform for enhancement to deliver a functional benefit. Put in perspective, what I like to call the *Malnutrition of Affluence* has taken root. This represents the fact that the more affluent we have become as a society, the less nutritious our diet has been. We have generally supplanted food quality with quantity, eating a calorie-rich, nutrient poor diet that lacks in biodiversity, while at the same time we have limited our physical activity. Now, more and more consumers recognize the deficiencies in their diet and are seeking ways to take an active role in maintaining their health & wellness, driving them to seek foods that provide greater functional benefit.

The History of Food



Seventy three percent of consumers overwhelmingly believe that food and nutrition play a great role in maintaining or improving health. With the rising and unsustainable costs of healthcare, the increased access to nutritional information, greater focus on self-treatment and avoidance of the ravages of the aging process, *prevention* is rising the tide of functional foods & beverages.

Remarkably, inflammation plays an important role in diseases as apparently diverse as cardiovascular disease, cancer, diabetes, osteoporosis, arthritis, Alzheimer's disease and autoimmune diseases. Chronic diseases account for more than 60% of all healthcare spending. Seventy five percent of people over the age of 60 have one chronic condition, while fifty percent suffer from two or more. I will focus on six conditions that have demonstrated a strong relationship to food, either as causative (although one can argue that nearly every disease or

condition is at least in part a result of diet) and/or a primary role in treating or managing that condition.

Obesity



I won't waste time reiterating much of what you probably already know, but for a few key facts to consider. Worldwide there are more than 1.6 billion overweight people, of which 400 million are obese (130 million in Europe). The problem is now so prolific as to affect 18 million children under the age of five. About 2.5 million deaths are linked to being overweight or obese. By 2050 there will be 3 billion overweight inhabitants of the world and 600 million of those clinically obese. Besides dramatically impacting our healthcare systems, sales of weight loss products surpassed \$144 billion in 2010.

While portion controlled foods and special diets are meager solutions to the problem, advances in nutritional and biological research are advancing some new and innovative approaches and product opportunities.

Bioactive compounds found in some botanical sources are demonstrating benefit through various mechanisms of action. For instance, Lovidia, a novel weight loss product, works by stimulating sensory receptors in the gut, which magnify important hormones that trigger the sensation of satiety. Lovidia should be ready for commercialization as a supplement in late 2013 or early 2014. As clinical evidence mounts on (or discounts) these emerging compounds, it's fair to assume many will see wide acceptance in a host of foods and beverages. New evidence is demonstrating a link between certain bacteria strains in the gut and weight loss, opening a new chapter for probiotics (I outline this in more detail later).

Diabetes



Closely related to the obesity epidemic is that of diabetes (type 2 or "Adult Onset"), a chronic condition called now common in children. Of those diagnosed with type II diabetes, about 80 to 90 percent are also diagnosed as obese. By 2025 5.4% of the global adult population will have diabetes. That's a 42% increase in developed countries and a 170% increase in developing

countries, perhaps proof that our *Western* diet should be considered a communicable disease. Currently around 220 million people worldwide have diabetes, but a new study funded by World Health Organization and the Gates

Foundation now puts the figure closer to 350 million. Since 1980 the number of people afflicted with diabetes has doubled.

Functional Food opportunities abound. Considering the immense number of those diagnosed, not to mention those under diagnosed, and the length of time this chronic disease has an impact on the lives of those affected, this is a key target for the functional foods & beverages. Also consider that diabetes is a lifestyle disease that is managed primarily through diet and exercise. I see prime opportunity for a few new brands that are solely focused on great tasting, convenient, and carefully formulated products that help the target audience manage their diabetes. These products will take much of the guesswork out of the equation for diabetics, allowing them to lead a more “normal” life, while enjoying their diet. Think about breakfast cereals that contain beta glucans, phytosterols, soluble fibers and the optimal blend of macronutrients and low glycemic carbohydrates.

Gastro Intestinal Disorders



One in seven people suffer a chronic gastro intestinal disorder. In the US alone, around 70 million adults suffer from digestive problems caused by poor consumption habits, high usage of additives for processing of food, and a high rate of antibiotic intake. 76 million Americans will get a food borne illness and 40 million travelers will suffer diarrhea every year.

In 2010 worldwide sales of products for digestive health reached \$17.7 billion. The US market for GI supplements alone was \$1.5 billion in 2012, up 13% over the previous year.

Just one of the causes of the profound GI issue is the prolific use of pharmaceutical medications, which is driving another GI issue: constipation. Four million adults have constipation and those over the age of 60 are five times more likely to suffer from it than those in their twenties.

Forty six percent of consumers are very/somewhat worried about the long-term effects of GI OTC remedies; 44% worry about becoming too reliant on these products and 40% are concerned about their potential negative interactions with medications/vitamins they take. This suggests consumers are seeking more natural alternatives. In fact, 37% of American consumers who had constipation/diarrhea say they changed their diet to treat the problem.

With such a multifaceted problem, and one so closely related to diet, you can bet that appropriately developed functional foods & beverages are increasingly being seen as primary options to mitigate and treat these far reaching problems.

Cardiovascular Disease



Currently, 36.9% of Americans have some form of heart disease, including high blood pressure, coronary heart disease, heart failure, stroke and other conditions. By 2030, over forty percent of Americans or approximately 116 million people will have some form of cardiovascular disease, a disease that is killing 17 million people every year. The cost of medical care for heart disease will rise to \$818 billion. Heart disease will also cost the nation billions more in lost productivity, adding another \$276 billion by 2030.

In 2010 worldwide sales of heart health nutritional products were \$11 billion and include up and coming nutraceuticals such as plant sterols, omega 3 (essential fatty acids), oat betaglucans, etc.

Cognitive Decline/Dementia

Alzheimer's disease has been called Type 3 Diabetes because there is increasing evidence that, like diabetes, it is linked to the diet we eat. The brain, dependent upon its fuel, glucose, is also very sensitive to insulin resistance, which occurs when the pancreas is overwhelmed. When the cells in your brain become insulin-resistant, you start to lose memory and become disoriented, and it is often characterized by the build up of beta amyloid plaque in the brain.



According to *Alzheimer's Disease International*, there were approximately 35.6 million people suffering from dementia in 2010, of which Alzheimer's disease is the most common form. The organization estimated that the economic costs (in 2010) amounted to \$604 billion, and predicted the numbers of people affected will double every two decades.

Aging

With the aging of the Baby Boomer generation, we're finally witnessing a broad based movement to slow or reverse the aging process, as this generation is refusing to yield to the inevitable process of growing old. Or at least we don't want it to slow us down or affect our lifestyle. This impacts a real need for products that support visual signs of aging (skin health), vision, energy and sex drive. The former category alone is a \$20 billion market in the US. The later is

illustrated by a recent product introduction called *Sexcereal*, a line of two gender formulated oat-based cereals formulated with ingredients that purport to increase libido and general health for men and women.

Research suggests that a nutritious but reduced-calorie diet blunts aging and significantly delays the onset of such age-related disorders as cancer, diabetes, cardiovascular disease and brain atrophy.

Selected Functional Ingredients

The six conditions noted above will each likely offer waves of opportunity for functional foods & beverages. Now let's look at a few specific nutritional compounds that continue to show greater promise in these novel products.

Antioxidants

Antioxidants are molecules that prevent other molecules from oxidizing. They act as free radicals in the human body and mop up from oxidative reactions. The botanical compounds traditionally called "antioxidants" demonstrate diverse characteristics, and advancing science is proving very unique and targeted benefits to this broad category of compounds.



The US market for products carrying an antioxidant claim is estimated at over \$1.2 billion and they are among the top five health components that consumers want in their food products. Twenty nine percent of U.S. adults are

seeking out high-antioxidant groceries, and 44% of women buy skin care or cosmetic products that promote their antioxidant content. Mintel reported that new antioxidant product launches for both food and food supplements increased by about 10% between 2010 and 2011.

Current awareness of antioxidants is very high, and while few understand exactly what they do, most recognize antioxidants as "good". But now industry is conducting more studies on condition-specific benefits including cardiovascular health, skin health, cognitive function, blood-sugar balance, weight management and inflammation.

Studies suggest that oxidative stress and systemic inflammation are involved in the pathogenesis of ischemic stroke and consuming a diet with a high total antioxidant capacity has been related to reduced inflammation.

According to researchers, increasing dietary intake of the antioxidant vitamins C, E, and selenium could help cut the risk of developing pancreatic cancer by up to sixty percent.

Patients with mild dementia were found to have lower serum concentration of antioxidants vitamin C and beta-carotene than control subjects. Furthermore, researchers have identified the enzyme PAI-1 as being inhibited by components of green tea extract, an antioxidant, potentially slowing the development of Alzheimer's disease. Earlier this year Nutricia launched Souvenaid, a functional beverage aimed at people in the early stages of Alzheimer's disease. It contains a cocktail of nutrients including antioxidants and PUFA's. Last year the *Journal of Alzheimer's Disease* reported that three daily cups of coffee consumed by people showing mild memory impairment had the power to prevent, or at least significantly delay, the onset of Alzheimer's disease. In studies, subjects receiving active antioxidant supplementation have shown better episodic memory scores.

Most eye diseases are a result of oxidative damage and/or inflammation, which in turn produce free radicals which lead to the onset of various eye diseases. Published in 2001, the Age-Related Eye Disease Study (AREDS 1), a major clinical trial sponsored by the NEI, showed that high levels of antioxidants and zinc significantly reduced the risk of progression to advanced AMD by 25%, and the risk of moderate vision loss by 19%. Dr. Jodi Luchs, an ophthalmologist from New York, has developed OJO, a functional beverage that provides the therapeutic benefits of the vitamins and antioxidants specified in the AREDS Study.

We are now seeing the development of a new and powerful class of antioxidants, such as synthetic triterpenoids, which has demonstrated the ability to block the development of Parkinson's disease.

Fiber

Seventy two percent of Americans are trying to increase their intake of fiber. Fiber is crucial to maintaining a healthy, optimum digestive system, and it helps control cholesterol, blood sugar, and regulates appetite, supporting weight loss. Consumers are recognizing these benefits: 84% are aware that fiber is beneficial for weight loss, 79% healthy digestion, 43% heart disease, 39% risk of cancer, 36% healthy blood-sugar levels.

But there is a gap in the market when it comes to awareness and actions. It is generally recommended that an individual should consume about 30 grams of dietary fiber per day, preferentially from foods not supplements. However, most

adults average about only 15 grams/day, or approximately half the recommended amount.

Probiotics

Probiotics represent one of the fastest growing sectors in functional foods. Global volume consumption is more than 3X that of omega-3, making probiotics the most successful functional ingredient in packaged foods after vitamins and minerals.



Global probiotics demand was \$27.9 billion in 2011 and is expected to reach \$44.9 billion in 2018, growing at a CAGR of 6.8% from 2013 to 2018. The lion's share of probiotic sales has been in foods and beverages, with annual growth forecast at 7.6% through 2015.

Eighty one percent of Americans ranked probiotics as the most important nutrient in a 2011, and 57% of shoppers want to learn more about probiotics and immune health, recognized as a secondary benefit after gut health.

But the current understanding and acceptance of probiotics, as strong as they are related to gut health and immune function, are just the tip of the iceberg. More than 100 trillion microbes, vastly outnumbering our other cells, inhabit the human body. And new research into the connection between the microbiome and chronic disease is advancing at a fast pace. MetaHIT, a 4-year, €22 million, EU-funded study, and the U.S. National Institutes of Health's Human Microbiome Project are just two examples.

The MetaHIT study has shown that the make-up of the human gut microflora may have a significant impact on the development of type 2 diabetes, leading to development of probiotic strains that are demonstrating positive effect on metabolic disorders and obesity.

Scientists have discovered a link between gut microbiota and obesity, noticing that microbial populations in the gut are different between obese and lean people, and when obese lose weight their microflora changes to that of a lean person. Two hormones responsible for sending hunger signals to the brain were found to not function properly without adequate levels of probiotics in the body. Decreased levels of probiotics result in a decrease in leptin production, which increases the urge to overeat and results in weight gain.

Canadian researchers found that probiotics not only boosted chronic fatigue syndrome (CFS) patients "good" bacteria in the gut but also led to a significant decrease in their depression and anxiety symptoms. The researchers believe that probiotics "crowd out" the more toxic stomach bacteria linked to depression and other mood disorders.

Furthermore, researchers are finding cardiovascular benefits with certain strains of probiotics. For instance, *L. reuteri* NCIMB 30242 helps reduce LDL and total cholesterol levels.

Probiotics are even showing great benefit for conditions such as oral health, as several strains have shown promise against gingivitis. Recently, oral lactic acid bacteria and bifidobacteria have been isolated and characterized for various oral health purposes, including caries, periodontal diseases, and halitosis. *S. salivarius* K12 and M18 can actually help fight common oral care problems by producing a natural protein that stops the growth of the bacteria that gives you stinky breath. *Lactobacillus paracasei* was found to be effective against the main bacteria associated with tooth decay.

Prebiotics

Not to be mistaken as probiotics, prebiotics are the food for probiotic growth in the gut. Prebiotics are multi-functional, as they also have an ability to help reduce the fat, calorie and sugar content in many foods while maintaining sweetness and adding to the fiber content.

US consumer awareness of prebiotics is now at 31%. New product introductions with prebiotics are slowly gaining speed, and the US market is forecast to double in the next 5 years. Prebiotics naturally align well with cereals, bars, breads and other higher fiber foods, but are suited for a wide variety of formulations especially in infant formula and milk. Prebiotics can also function as a humectant and mask the bitter notes of bran and high intensity sweeteners.

Phytosterols



Phytosterols are plant-derived compounds that are similar in structure and function to cholesterol, but phytosterols actually inhibit the intestinal absorption of cholesterol.

While statins work by reducing cholesterol synthesis by inhibiting the rate-limiting HMG-CoA reductase enzyme, phytosterols reduce cholesterol levels by competing with cholesterol absorption in the gut, a mechanism that complements statins. Demonstrating synergistic benefit in statin users,

phytosterols further reduce cholesterol levels by about 9% to 17%. An obvious market exists considering the number of statin users.

The American FDA concluded that when consumed in the range of 1 to 3 grams in enriched foods, phytosterols resulted in statistically significant (5-15%) reductions in blood LDL cholesterol levels relative to placebo. The FDA also concluded that a daily dietary intake of 2 grams a day of phytosterols (expressed as non-esterified phytosterols) is required to make an authorized health claim relating phytosterol consumption to cholesterol lowering and CVD risk. The European Foods Safety Authority (EFSA) concluded that blood cholesterol could be reduced on average by 7 to 10.5% if a person consumes 1.5 to 2.4 grams of plant sterols and stanols every day. The scientists found that the effect is usually established within the first 2–3 weeks.

The global market for phytosterols was estimated to be worth over \$391.5 million in 2010 and is expected to exceed \$887.8 million by 2018, forecast to grow at a CAGR of 9.5% from 2013 to 2018. Europe is currently the biggest market for phytosterols, accounting for approximately 51% of the global market in 2011, followed by North America.

PUFAs (Essential Fatty Acids)

As already noted, essential fatty acids have been a major force in the functional food & beverage market, and I suspect this will continue for the foreseeable future. 2011 global sales exceeded \$1.86 billion, and PUFA's are predicted to see 13.6% CAGR for 2012 to 2016. One wild card is the acceleration of pharmaceutical EFA products that are hitting the market, which will likely drive stronger growth for functional foods & beverages, but may have a negative effect



on the supplement market, although time will tell whether that market will also kick into overdrive.

Research shows that PUFA's reduce inflammation and may help lower risk of chronic diseases such as heart disease, cancer, and arthritis, as well as mounting data to support cognitive health benefits. Several clinical studies suggest that diets rich in

omega-3 fatty acids lower blood pressure in people with hypertension. Fish oil has been shown to lower levels of triglycerides, and to lower the risk of death, heart attack, stroke, and abnormal heart rhythms in people who have already had a heart attack. Fish oil also appears to help prevent and treat atherosclerosis by slowing the development of plaque and blood clots, which can clog arteries.

On the cognitive front, low levels of DHA have been linked to memory loss, depression, bipolar disorder, attention deficit disorder, schizophrenia, autism and general learning difficulties or bad moods. With aging comes a likely increase in ROS and hence a concomitant decline in membrane PUFA concentrations, and with it, cognitive impairment. Neurodegenerative disorders such as Parkinson's and Alzheimer's disease also appear to exhibit membrane loss of PUFA's. Thus it may be that an optimal diet with a balance of omega-6 and omega-3 fatty acids may help to delay their onset or reduce the insult to brain functions, which these diseases elicit.

So now that I've defined six important conditions that are closely aligned with food, and identified six nutritional compounds that have exceptional growth opportunity in the functional food & beverage market, allow me to provide some insight into where you might cast your bread upon the waters.

Trends to watch

After analyzing consumer lifestyle trends, consumer perceptions, demographic data, product sales and ethnographic research, I can offer the following seven currents that are feeding the sea of change in functional foods & beverages.

Lifestyle Antidote. Managing chronic conditions such as diabetes, CVD or obesity with foods that can offset the effects of the condition is a simple, self-directed concept. To the extent that a food or beverage can deliver convenience and simplicity in a health solution without the consumer having to sacrifice taste or lifestyle, you have a big hit on your hands.

Better Breakfasts. Consider the fact that 31 million Americans, about 10 percent of the U.S. population, do not eat breakfast. Driven by a need for convenience for time-starved consumers, this trend is all about packing the right blend of nutrition and function into a convenient and delicious serving occasion.

Cosmeceuticals.

Whether it's *Beauty from Within* or functional ingredients for topical use, this is a growing trend that will be continuing. Fueled by an anti-aging and self-directed healthcare mindset, consumers are getting very savvy to new advances in botanical research and are looking for new solutions. In 2011, US sales of skin care cosmeceuticals reached \$4.7 billion, and the cosmeceutical hair care category is estimated at \$3 billion.

Healthier Snacking. 74% of people surveyed believe that "natural" means "healthier". Guilt reduction is the driving force as consumers don't want to give up on snacking, but they want to feel better about the snacks they consume. Yet they will not give up on the taste factor and convenience that is the cornerstone of snacking. The global snack foods market will reach \$334.7 billion by 2015.

Boosting Reality. Experiential products that can deliver a boost to life such as energy or mood alteration often see dramatic consumer response. While one may consider alcohol as the poster child for this trend, there are many nutraceuticals that pack an experiential punch. The paradox is that the more experiential the product, the more likely it is to bump heads with regulatory barriers.

Trend Monger. Using food as a badge of sophistication or as an ethical statement, there is a movement towards the exploration of more esoteric, cultural foods, especially ones that provide a unique ethical story such as fair trade, heirloom, varietal, etc.

Eco Warrior. Taking the Trend Monger one step further, there is consumer interest in using food choices as a means of activism. This includes thoughtful sourcing of ingredients, manufacturing and packaging, as this trend is driven by an intense interest in using the product as a means of driving social change. Sustainable ingredients, raw foods, negative carbon footprint, minimal packaging are some of the keys to this trend.

With so much opportunity for growth in the functional food & beverage category, go out and chart a course that will support a healthier life for our fellow humans. Just remember to stay out of hot water.