

# THE ROAD TO WELLNESS



**T**hink back over the past year. How many new products did you introduce, or how many changes to existing brands did you make that catered to the growing consumer desire for healthier living? If the answer is zero, by this time next year you may find yourself left in the dust along the road to wellness.

The majority of today's consumers, driven by the aging boomer population, want to know that the products they choose – from traditionally good-for-you products to indulgent treats – are positively impacting their health. And that goes beyond choosing to eat five to 10 fruits and vegetables a day. It means buying lower-sodium soups, breads made with whole grains, energy drinks fortified with vitamins and antioxidants, even trans fat-free cookies baked with ancient grains and dark chocolate. It also means seeking out higher-priced specialty foods such as gluten-free or guaranteed allergen-free bread, snacks and baked goods to ensure good health and safety.

This year's Wellness Report focuses on ideas to help you improve your products' better-for-you quotient, with articles on low-sodium content, fortification, functional foods and much more.

Illustration: Shanae McCowan

# TAKEN WITH A GRAIN OF SALT

High-sodium products may be poised to become the next target on consumer hit lists

BY CLIONA REEVES

This is unlikely to be the first time you've read that excessive sodium in your diet is not a healthy situation. But you may be surprised to learn that high sodium levels could become the next major consumer food concern, just as trans fat has been.

"High levels of sodium in the diet could be the next major and preventable environmental vector of disease in Canadian society," says Dr. Bill Bettger, associate professor in the University of Guelph's department of Human Health and Nutritional Sciences. "A major problem is that so much sodium is hiding in plain sight. Only about 30 per cent of the sodium we consume we add in cooking or at the table. The other 70 per cent is already in a wide range of processed foods, from meat products, to bakery goods, to soups and stews, and even to artificial sweeteners. Sodium also occurs naturally in fruits and vegetables," he says. "Health Canada's current Daily Value amount for sodium per day is 2,400 mg, where a low-salt diet should not exceed 1,500 mg. But just try doing that. While precise calculations are difficult, it's estimated that most of us routinely consume two, three or more times the recommended limit, and are well into the toxic range."

## THE QUIET CRISIS

The connection between high sodium consumption and hypertension (high blood pressure) has long been known, but the issue no longer appears to be as high profile as it once was. However, high sodium levels could now be a risk for not only those with hypertension, but among the general population. "Hypertension is a known risk factor for cardiovascular disease and heart attack, major killers in the Western world," says Bettger. "But there is also a connection between high sodium levels and osteoporosis, possibly due to increased excretion of calcium in the urine. There is also a connection between sodium and cancer, due to damage to gastric mucosa. The connection between sodium and diabetes is due to the way sodium can increase (i.e. worsen) insulin resistance and glucose intolerance, independently of high blood pressure. A newer area of research is the connection between sodium and mood or neurological functioning.

It has not been linked with depression, but does seem to have a harmful effect on learning ability and development," he says. "However, it cannot be overstressed that everyone responds differently to different stimuli, and much more work is needed to investigate this connection."

These differences in salt sensitivity may begin in the womb. "High levels of sodium consumption during pregnancy seem to result in a higher sensitivity to the effects of sodium, even if the offspring is then restricted to a low-sodium diet for life," says Bettger. "We have a serious issue on our hands and must start dealing with it now, especially in the area of processed foods, where much of the sodium we consume is found."

## KEEPING A LOW PROFILE

So why isn't the sodium story as high profile as, say, the low-carb craze or the low-cholesterol stories? "The groundswell of attention is still building, and the consumer has not yet been saturated by media coverage," says Carol Culhane, owner/operator of International Focus Group Ltd., a business development consulting company based in Toronto.

And yet our relationship with salt is long-standing and profound. While all our body fluids contain salt (sodium chloride), we first used salt thousands of years ago as a preservative. "Most consumers have no idea just how much sodium they are consuming, or how much is too much," says Kathryn Cooper, vice-president of the GFTC's Training Services and Strategic Projects. "Sodium levels are hard to gauge. So many of us are eating several times Health Canada's recommended maximum without even knowing it. As consumers become more conscious of sodium levels in products they routinely buy, they will put more and more pressure on the food industry to develop lower-salt alternatives."

## FROM CRISIS TO OPPORTUNITY

In some countries, pressure is already on producers to lower the sodium content of their goods. "In the U.K., the government persuaded all sectors of the food processing industry to reformulate to lower sodium levels, and most have done so – all without legislation," says Culhane. "The U.K. goal is to

reduce per capita daily salt consumption from nine grams per day to six grams per day, through product reformulation. Government and industry together are working collaboratively to provide suitable alternatives. We need to start doing the same here before mandated to do so."

Of course, it's not always so simple to remove the sodium from a product. "Sodium not only provides flavour to products, but also has important functions to perform as a processing aid," says John Michaelides, the GFTC's director of Technical Services. "Sodium provides texture and structure; it's acted for thousands of years as a preservative. In fermentation, salt is essential in the control of the process. It strengthens the gluten that gives baked goods their structure. It improves the tenderness of meat by improving the binding of water with proteins. It stabilizes emulsions, enhances colour, binds water and enhances other flavours. Sweet products, for instance, contain some salt to enhance the sweetness. This is a long list of functions to have to replace, and the job of replacing sodium is not an easy one."

There are options, however. Many ingredient suppliers have a range of sodium-substitute products and are eager to explore those options with their clients. Development can be a complicated process, but the payoff in happy, healthy customers and an improvement in the health of the general population is an investment in the future.

"Companies which make the effort to develop low-sodi-

um or reduced-sodium products can also pursue the possibility of putting a nutrient content or health claim on their product label, which can help attract health-conscious consumers," says Judy Stuart, the GFTC's senior applied research scientist. "There are strict requirements for sodium levels which a product must comply with before the claims can be used, and use of any of them triggers the need for Nutrition Facts panel. But as more and more people become conscious of the amount of salt they consume, both the claims and the Nutrition Facts panels can be excellent marketing tools to differentiate your product from the higher-sodium competition."

The final responsibility for vigilance, however, rests with the individual consumer, who is often thoroughly confused when keeping track of fat, cholesterol, fibre, vitamin and now sodium levels in the foods they purchase. Even a product marketed as healthy, due to its lower fat content, may contain more sodium than the regular product. The more food processors can consider all the angles, and produce products that are healthful from multiple perspectives, the more likely consumers will remain loyal purchasers of those products. "The crisis is coming," says Bettger. "It's just a question of when, and whether we have the foresight to take action now." [FC]

*Cliona Reeves is Communications manager at Guelph, Ont.'s Guelph Food Technology Centre ([www.gftc.ca](http://www.gftc.ca)).*

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## THE WELLNESS REPORT

# RECIPE FOR SUCCESS

Top-selling functional beverages are more than a simple mix of ingredients • BY RAM CHAUDHARI

Crowded shelves and the continued onslaught of new product introductions present functional beverage marketing and R&D professionals with a daunting task – how to make their beverage products stand out. These days a growing number of manufacturers are looking to differentiate their products by addressing health concerns through fortification, specifically by combining multiple ingredients into drinks. This trend is fuelling the emergence of many new drink categories to serve specific demographic audiences and to address health concerns.

The functional beverage category continues to generate new and exciting concepts, such as energy and functional drinks with value-added ingredients. Many of these ingredients, particularly antioxidants, B-complex vitamins, minerals and herbal extracts, are now available to meet specific needs of beverage manufacturers. However, developing a drink goes beyond adding a few functional ingredients and mixing them up. Formulation concepts, ingredient selection, processing, packaging and test marketing are all key to creating

a quality product that is stable and tastes good.

A beverage concept is defined in terms of target population and a particular nutritional profile, such as meal-replacement drinks, soft drinks, juice-based blends, sports/performance drinks, flavoured coffees and teas, and pre- and probiotic drinks and dairy beverages. The acceptability of a product is an important predictor of product success in the marketplace. However, it's a subjective process, as acceptability can change according to the targeted consumer. For example, meal replacement drinks should be palatable to someone on a liquid diet, but not as pleasurable as a sugar-laden, fruit-flavoured tea or energy beverage aimed at younger consumers.

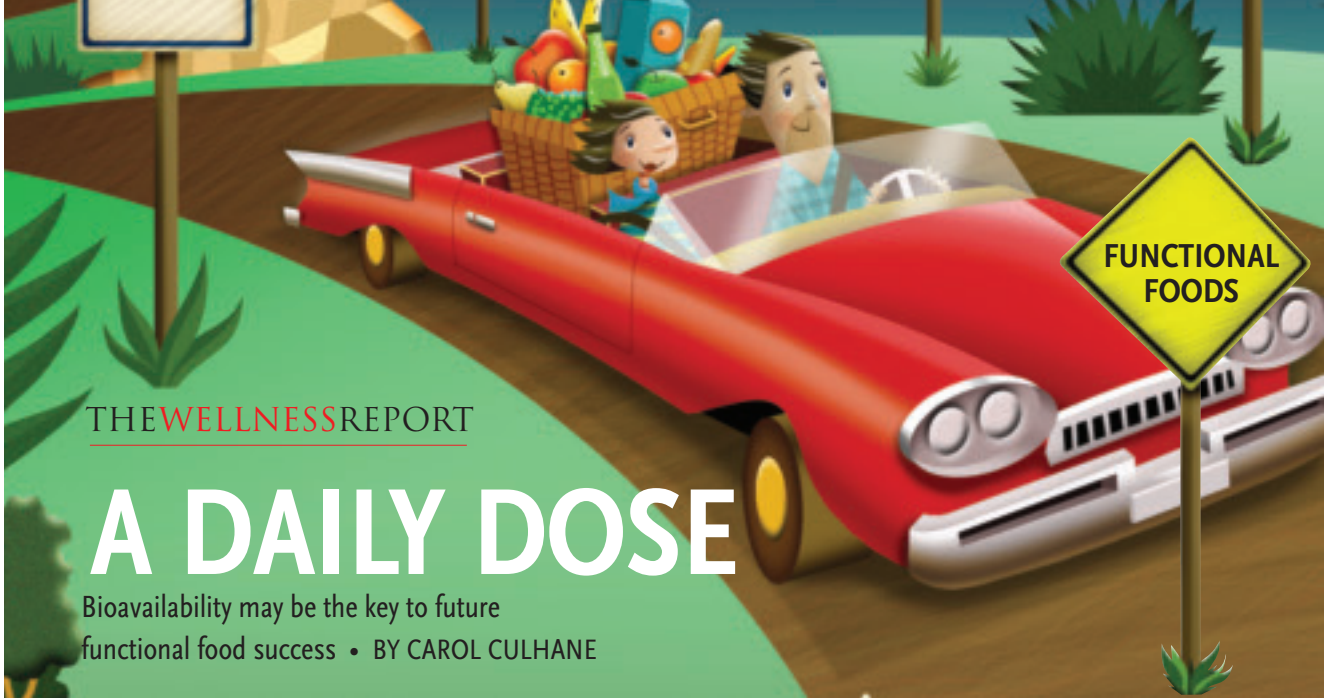
The speed of product innovation and new product introduction has significantly increased as functional drinks have become more mainstream. Even with fast track product development, many companies are using ingredients that have a scientific foundation and a strong safety record to back them up rather than using “ingredients of the moment.” This is in part because consumers are demanding that the products they buy actually deliver on health claims. Examples of high-demand ingredients being used in drink formulation are taurine, caffeine, antioxidants, lycopene, pre/probiotics, whey protein isolates containing branched chain amino acids and botanical extracts.

So how should a manufacturer approach drink formulation, considering today's needs? Start by prioritizing the benefit of a particular ingredient in a given beverage. To be credible, a drink should offer a minimum concentration of active components to ensure a measurable benefit. It's also easy to focus on active ingredients and overlook the importance of the underlying foundation properties of the drink. Many of the active ingredients contribute metallic or bitter flavours. Therefore acidity, saltiness and sweetness should be carefully balanced to optimize a drink's taste and flavour profile. Despite the quest for functionality, the single greatest predictor of a new drink's success is taste, not its functional ingredients.

When identifying ingredients, it's also important to consider usage of multi-functional ingredients. For example, sugar functions as both a sweetener, osmotic-balancing agent and energy source. Similarly, glycerol is a sweetener, energy source, osmotic-balancing agent and muscle dehydration preservative. Phosphate salts contribute free phosphate molecules, isotonic balance and buffer acid important for microbial and colour stability and flavour release.

By working closely with an ingredients supplier manufacturers can develop the appropriate custom nutrient system to differentiate their product, while meeting label claims, formulation challenges and processing requirements. Through rigorous testing and collaboration, it is possible to determine and manufacture the correct premix combination for a broad range of drink products and troubleshoot any nutrient application for optimum success. [FC]

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THE WELLNESS REPORT

# A DAILY DOSE

Bioavailability may be the key to future functional food success • BY CAROL CULHANE

The methodical application of functional foods to human health often assumes the use of logic and characteristics specific to pharmaceuticals. Common examples are identification of the active ingredient, dosage amounts and daily dose requirements to achieve a desired physiological outcome. A more complex, highly important yet rarely discussed attribute in the functional food market is bioavailability.

A term borrowed from the pharmaceutical sector, bioavailability describes the fraction of an administered dose of medication that enters the blood stream. When medication is administered intravenously, its bioavailability is 100 per cent. However, when administered by mouth, bioavailability is decreased as the medication first undergoes digestion. Called “first pass metabolism,” this effect can occur in the gastro-intestinal (GI) tract or the liver, depending on the type of drug. Allowances must be made for the amount of first pass metabolism a drug will undergo before reaching the blood system so that an excess amount of the drug will not enter the circulatory system.

Functional foods are, of course, consumed orally, giving rise to several factors likely to decrease or increase the bioavailability of the health-promoting ingredients they contain. Nutrient bioavailability is directly related to nutrient absorption, all of which takes place in the GI tract, mostly the intestine. Some bioavailability interactions amongst nutrients are well-known in the nutritional community. Vitamin C, for example, enhances iron absorption, transport and storage in the intestine. On the other hand, dietary fibre and phytates in wheat decrease iron absorption in the intestine, especially iron contained in wheat.

New scientific findings show that inulin, a prebiotic that is activated in the intestine, facilitates calcium bioavailability, similar to the long-established role of vitamin D. So by adding inulin to dairy products such as yogurt, producers create an organoleptic benefit by providing a smooth, creamy mouthfeel, while offering the physiological advantage of

facilitating calcium absorption. Phytosterols – a plant-based compound and the active ingredient in the cholesterol-reducing margarine Benecol, marketed in 15 countries worldwide, not including Canada – can reduce the amount of cholesterol entering the bloodstream. Since cholesterol is absorbed in the upper third of the intestine, phytosterols in the intestine block the bioavailability of dietary cholesterol and inhibit the re-absorption of cholesterol from bile acids. However, phytosterols also inhibit the bioavailability of several fat-soluble vitamins such as A, D, E and K. Finally, beta-glucans, the component of oats and barley responsible for cholesterol-reduction, claim their effect by reducing the bioavailability of saturated fat and cholesterol in the intestine, without adversely affecting the absorption of fat-soluble vitamins.

Increasingly, these newly recognized ingredients – inulin, phytosterols, beta-glucans, and many others – use the intestine as their physiological mechanism. Traditionally, the liver was regarded as the most important metabolic organ owing to its essential role in drug metabolism. However, the primary role of nutrient bioavailability in achieving desired health outcomes is shifting focus, corresponding to an advanced understanding of the functions of the intestine.

Lutein, an anti-oxidant and pigment prevalent in dark green leafy vegetables and eggs, plays a critical role in the maintenance of eye health and in the reduction of age-related macular degeneration (AMD). Lutein, called a “macular pigment” because it is concentrated in the macula or “hole” of the retina, has significantly higher bioavailability when derived from eggs than from spinach or lutein supplements. Lutein is lipophilic, meaning it is chemically attracted to fat and oil. The fatty acid content of the egg yolk, where lutein in eggs is located, facilitates the absorption and bioavailability of the lutein.

There is clearly no limit to the creativity and determination of scientists. Take the example of folate deficiency, a frequent cause of anemia in alcoholics. Researchers showed that

added folic acid is readily soluble in wine, and highly bioavailable in both normal volunteers and intoxicated chronic alcoholics, and concluded that "folate deficiency in alcoholics could be prevented by the fortification of alcoholic beverages with the vitamin." Published in the reputable *Annals of Internal Medicine*, the recommendation may be waiting for one of Canada's innovative and nimble vintners to take up the torch. After all, Canada was the first country to mandate the addition of folic acid to wheat flour.

In some cases, unfortunately, a functional food can be dysfunctional, and bioavailability is at the root. Research underway since 1998 has proven that grapefruit juice significantly increases the bioavailability of some pharmaceuticals (cholesterol-reducing, hypertension-reducing, HIV/AIDS treatment, for example) to that of dangerous proportions. Consequently, grapefruit juice, once the subject of indirect health claims for risk reduction for some types of cancer and heart disease, and its partner, grapefruit, the darling of the famous grapefruit diet, have suffered a debilitating decrease in consumption. Grapefruit juice reached peak per capita U.S. consumption in 1998/9, but plummeted 31 per cent to a 10-year low in 2001/2 as North Americans shunned grapefruit. As a result, Florida has lost almost one-third of its grapefruit producers.

The culprit in grapefruit juice was revealed last month in the *American Journal of Clinical Nutrition*. A foreign sounding, though not all that rare compound called furanocoumarins in grapefruit and grapefruit juice blocks the first pass metabolism in the intestine of some drugs, resulting in a consistently higher amount of the drug entering the blood stream than pharmacologists calculate. Furanocoumarins are potent chemical defenses used by several plants to thwart predators. In wild parsnips, they allow the plant to resist its principal enemy, the parsnip webworm. "Celery picker's itch" and "bartender's itch" are two skin conditions suffered when some humans come into contact with celery plants or the oil of lime peels. One can see ever-optimistic marketers at work with the suggestion that furanocoumarins (extracted from grapefruit, of course) be added to obstinate, difficult to absorb drugs to improve their bioavailability. The medical community has pushed back with the authoritative statement that "grapefruit juice as a drug-sparing agent in treatment involving expensive medication cannot be derived from the information currently available on grapefruit juice interactions." It appears that Florida's grapefruit crop is at a new turning point – already the projected tonnage for 2005/6 has been raised by 1.2 million boxes to 19.2 million boxes. With increased scientific emphasis on nutrient bioavailability and the intestine, and less on the drug-metabolizing liver, one can hope that a reversed situation will arise in the future in which drugs will be shunned because of their negative interactions with functional foods, rather than the current plight being suffered by grapefruit and its juice. [E]

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# BRIGHT BOLD BEAUTIFUL



## Fields of Bountiful Blueberries

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