Nutritional Outlook

The manufacturer’s resource for dietary supplements & healthy foods and beverages

June 2016
Vol. 19, No. 5

TURMERIC RISING

Skyrocketing sales. Strong science. How turmeric became a superstar

p. 26
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U.S. Hemp Food, Beauty Sales Climbed to $283 Million in 2015

Health Canada Approves Triglyceride Health Claim for EPA and DHA Omega-3s in Food

From the Editor

DOES FDA'S KIND DECISION JEOPLIDIZE THE FUTURE OF THE “HEALTHY” MARKETING CLAIM?
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Google Calls Turmeric a Rising Star

In this issue of Nutritional Outlook, we turn our attention to turmeric. By all accounts—sales data, marketing speak, and supplier feedback—interest in turmeric is growing fast. But if you don’t want to take our word for it, how about taking Google’s word for it?

The search giant recently published “Food Trends 2016: U.S.,” a report examining which food terms Google users searched for most between January 2014 and February 2016. Sitting at the top of the list of what Google deems “rising stars”? Turmeric. (I should take a moment to explain that Google defines “rising star” as a food term experiencing sudden growth, with the caveat that “these trends might not last.”) Joining turmeric on the list of rising stars are jackfruit, cauliflower rice, sourdough bread, “funfetti,” and vegan donuts.

The report notes that turmeric searches grew 56% from November 2015 to January 2016 alone. Turmeric also heads up all searches that Google classifies as “food with a function.” Turmeric is first on the list, followed by apple cider vinegar, jackfruit, Manuka honey, kefir, coconut milk, erythritol, bone broth, cauliflower rice, avocado oil, bitter melon, arrowroot powder, high-protein snacks, and nine other contenders.

Google also did a deep-dive analysis of five leading trends. Turmeric is the only herb included in the group. The other four trends Google highlights are “Traveling through Taste,” “Experimenting with Pork,” “Bite-Sized Snacks,” and “The Pasta Comeback.”

In its deep dive, Google analysts dissected how and when consumers searched for the term turmeric. The report reveals, for instance, that Monday is the top day of the week for turmeric searches; interest trails off as the week progresses. Top associated turmeric keywords—meaning terms consumers search for in combination with turmeric—have to do with forms of turmeric as well as recipes: powder, golden milk, ground, smoothie, root, drink, juice, recipe, honey, pepper, fresh, and organic. Google moreover confirms that the word turmeric is trending across the country, registering in “all major cities across the U.S. in December 2015.”

The report even looks at YouTube data, finding that the top five–visited turmeric videos are educational and account for 3.9 million views. YouTube topics searched in combination with turmeric were acne, arthritis, autoimmune disorders, blood sugar, heart health, joint pain, depression, detoxification, blood pressure, painkiller, sleep, weight loss, and more.

Is this data meaningful? Arguably, yes. As the Google team states in the report’s intro, “With every query typed into a search bar, we are given a glimpse into user considerations or intentions. By compiling top searches, we are able to render a strong representation of the United States’ population and gain insights into this population’s behavior.”

What the data show, then, is that interest in turmeric is at an all-time high. This interest is undoubtedly driven by emerging science on turmeric. HerbalGram reported in its August–October 2015 issue that as of July 2015, the National Institutes of Health’s PubMed database listed almost 8000 studies on turmeric’s active constituent, curcumin; since then, nearly 1000 studies have been added to the list.

To keep up with what’s new, starting on page 25 writer Robby Gardner unpacks some of the latest studies related to turmeric and curcumin. We hope you enjoy our update on this herbal superstar.

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Does FDA’s KIND Decision Jeopardize the Future of the “Healthy” Marketing Claim?

It’s been more than a year since FDA first warned KIND against using the term healthy on its products, but early last month the snacks brand declared victory. In a reevaluation of its original objection, FDA announced on May 10 that KIND is indeed allowed to use the term healthy on its products because it is a statement of “corporate philosophy,” rather than a health claim. But by acquiescing, did FDA open up a loophole allowing more liberal use of healthy on food labeling?

The saga first began in March 2015 when FDA sent a warning letter to KIND in objection to its use of the phrase “healthy and tasty” on several KIND snack bars. FDA said KIND’s products exceeded the threshold of fat per serving outlined under FDA’s definition of “healthy” nutrient content claims, and therefore the products could not carry the term.

Following months of media scrutiny and ensuing lawsuits from consumer-protection groups, KIND responded in December with a citizen petition urging FDA to update its “outdated” requirements related to food labeling. The petition noted that FDA’s current regulations for “healthy” claims—which focus on fat, saturated fat, sodium, and cholesterol—were last updated more than 20 years ago and may unjustly malign many ingredients now thought to be nutritious.

“Modern science tells us that the unsaturated fats in nutrient-dense foods like nuts, seeds, and certain fish are beneficial to overall health,” Joe Cohen, senior vice president of communications at KIND, tells Nutritional Outlook. “However, the current regulations preclude foods generally considered to be good for you—like nuts, avocados, and salmon—from being labeled as ‘healthy’ due to their inherent fat content.

At the same time, the regulation allows items like fat-free chocolate pudding, some sugary cereals, and low-fat toaster pastries to carry the ‘healthy’ designation.”

Health Claims versus “Corporate Philosophy”

KIND’s argument seems to have resonated. On May 10, FDA said that it would be reevaluating its regulations for “healthy” nutrient content claims, possibly by inviting public comments on the issue in the near future. And in the meantime, FDA said KIND can continue to use the term healthy on its product labeling because it is an expression of the company’s “corporate philosophy” and not a health claim, so long as the text is not included in the same panels as nutrition information.

“FDA has now affirmed KIND can use healthy on our wrappers again—just as we had it before,” Cohen says.

And beyond this case, FDA’s acceptance of healthy as a philosophy rather than a health claim could have big implications for the food and beverage industry.

“It does appear that the agency is recognizing that not every defined term that appears on a label is a claim,” says Kristi Wolff, special counsel for the law firm Kelley Drye & Warren LLP (Washington, DC). She adds that this decision provides “an important distinction for industry.”

A New Loophole?

Now that KIND has FDAs approval to label its products as “healthy” thanks to its company’s philosophy, will other firms take advantage of this precedent to advertise their products as “healthy” without meeting FDAs nutrient content requirements for actual health claims?

“I don’t think it’s intended to be a loophole, but it could be used that way,” says Wolff.

“Companies will want to carefully consider how they position product claims versus brand philosophy statements so that they are clear to consumers. To the extent that it is a loophole or brands aren’t careful in their use of terms, it would not be surprising to see class action [lawsuits] filed or consumer interest groups target brands that may be using aggressive messaging.”

A New Definition of Healthy

Looking further down the road, if FDA were to revise its regulations for “healthy” claims, one likely new criterion might be sugar, Wolff explains.

“I would not be surprised if sugars, and particularly added sugars, were included as part of any new healthy definition,” says Wolff. “Likewise, we may see restriction on fat change given that we now know more about different kinds of fat than we did when the current regulations were finalized.”

Then again, there’s also the question of whether healthy is actually a powerful term in the eyes of consumers. KIND believes consumers are likely confused by the way healthy is currently defined, KIND’s Cohen explains, and the brand may not even continue using the term.

“To be honest, we’re unsure whether we’ll be adding healthy back to our packaging,” Cohen says. “This has been more of a matter of principle given our mission to make healthy and tasty snacking a way of life.”
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Like any industry making health-related claims, dietary supplement makers are beholden to FTC requirements to back up any marketing claims with “competent and reliable scientific evidence.” Supplements are not held to the same substantiation bar that drugs are, however, and thus supplement makers are allowed to rely on numerous forms of competent and reliable scientific evidence. This includes studies on individual ingredients published in scientific literature. In short, supplement firms are not required to perform a study on their finished product.

In April, however, a court injunction handed to a Santa Monica, CA–based supplements brand, Neurobrands LLC, ordered the firm to conduct at least one human study on each of its four liquid-supplement products: Neuro Sonic, Neuro Bliss, Neuro Daily, and Neuro Sleep. The civil complaint, brought by the Santa Monica City Attorney’s office and the Los Angeles County District Attorney’s office, took issue with a number of marketing claims Neurobrands made, including “supports memory,” “strengthens your focus and creativity,” “provides fuel for the brain,” and “promotes healthy aging.”

Adam Radinsky, Santa Monica’s chief deputy city attorney for consumer protection, says that during the city and county’s investigation, the studies Neurobrands supplied as evidence were ingredient studies the company had culled from the literature. “The studies were studies that were done on various ingredients for the most part that were found in the various drinks,” Radinsky tells Nutritional Outlook. Radinsky did not disclose more details of the studies themselves, but said, “There’s a wide variety of evidence that the company presented, and we concluded overall that it did not sufficiently back the claims that were being made.”

The settlement Neurobrands agreed to in April requires that, within three years, the company either conduct one human study on each of its finished products or discontinue selling that product. Specifically, the orders say, “Defendant will control the design and implementation of these studies and shall provide the published results of all such studies to the People’s counsel.” The injunction’s other stipulations include requiring the firm to re-market some of its products as conventional drinks instead of dietary supplements, as well as to pay $500,000 to the city and county.

So far, Neurobrands—who, in agreeing to the settlement, does not admit to liability or wrongdoing—has published one product study. The company began the study on its Neuro Bliss relaxation product in 2012, before the initial investigation began in 2013. Nutritional Outlook reported on those preliminary study results in July 2015, and the study is now published in the journal Nutrients. In addition, Neurobrands reports it has completed another study, on Neuro Sonic, with results currently being analyzed by noted Canadian contract researcher KGK Synergize. The firm has two additional clinical trials underway, including one on Neuro Sleep.
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Finished-Product Studies, FTC Standards

This case raises the crucial question of whether or not companies are required to perform studies on their finished products in order to back their claims. First and foremost, by law, the FTC does not require studies on finished products, and the agency does permit studies on individual ingredients as substantiation. “FTC definitely allows ingredient studies to be used to support claims, with the caveat that the study still has to be relevant to the product’s specific claim that you’re making, and also they have to show that the absence or the addition of other ingredients wouldn’t affect your ability to rely on that ingredient study,” says Rend Al-Mondhiry, Esq., associate general counsel, Council for Responsible Nutrition (CRN; Washington, DC).

When asked whether there are any laws that require a company to have a finished-product study, city attorney Radinsky says, “I can’t point you to a particular law that says it’s illegal to advertise something if you don’t have a study on that product.” He does point to FTC’s official “Dietary Supplements: An Advertising Guide for Industry,” which gives examples of times when individual ingredient studies may not be sufficient to prove a product’s efficacy—for instance, as the guidance states, if “the combination of multiple ingredients might result in interactions that would alter the effect or safety of the individual ingredients.” In this case, FTC’s guidance says, “A better approach would be to investigate the safety of the specific combination of ingredients contained in the product.”

Radinsky says, “Even in the absence of a black-and-white law that says you need a study on the exact same product, there certainly can still be problems.” In the case of Neurobrands, Radinsky would only disclose that the company “did not have sufficient evidence to back the claims under the federal standard” of competent and reliable evidence.

In fact, the FTC allows supplement companies to leverage numerous types of scientific evidence as substantiation, as long as the evidence is deemed by experts to be competent and reliable. It’s a standard that legal courts continue to uphold. Kristi Wolff, special counsel at law firm Kelley Drye & Warren LLP (Washington, DC), points to one of the most recent cases to uphold this standard: the contempt case between the FTC and probiotic-supplement maker Bayer Corp. over Bayer’s Phillips Colon Health supplement. Last fall,
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the courts ruled for Bayer, with the New Jersey federal district court judge citing FTC’s own guidance which affirms that supplement firms are allowed to rely on a “totality of evidence,” including animal studies, in vitro studies, epidemiological studies—and, indeed, ingredient studies. During the case, Bayer presented more than 100 scientific articles it cited from scientific literature to supports its product claims.

Red Flag?
Because this is a settlement, CRN’s Al-Mondhiry notes, the parties involved “can negotiate the terms any way they want.” But it’s still worth asking whether the stipulation for finished-product studies is a red flag, beyond FTC requirements, for the supplements industry at large.

Of the settlement terms, Kelley Drye's Wolff says, "It is remarkably broad in that it addresses claim substantiation, formulation, labeling, notice to vendors, and product shelf placement. I am not aware of a single FTC order or FTC action that covers the same scope." It’s also worth pointing out that Neurobrands’ claims such as “supports memory,” “enhances mood,” and “daily dose of immunity” are not are unusual in the dietary supplements structure-function claims space. Chris Noonan, scientific and regulatory advisor for Neurobrands LLC, says, "Anyone with even a rudimentary understanding of the science behind dietary ingredients would recognize those claims as fairly benign." Noonan adds, "We have three food and drug law firms advising the company. We have a legion of scientific advisors guiding our claims substantiation. Compared to a majority of marketers in the dietary supplement industry, I think you could agree these claims are fairly conservative."

As for the ingredient studies the company has in hand, Noonan says that “anyone fluent in basic science would understand there is significant scientific evidence in support of such ingredients as caffeine, L-theanine, melatonin, vitamin C, vitamin D, magnesium, selenium, and zinc.” He says, "Even before pursuing clinical research on the products themselves, the company ensured that, at a minimum, the ‘anchor’ ingredients (anchoring the products to efficacy) matched the dosage amounts studied in clinical research.” Nevertheless, Noonan says, Neurobrands decided to enter into settlement to avoid the further pain and cost of a jury trial. "After three years of negotiations, and ultimately with the disregard for the Neuro Bliss clinical trial evidence, it was apparent that no amount of evidence would suffice and only a jury trial would ultimately settle the dispute. Layer in the resources of two separate district attorney’s offices plus the need to publicly justify their time; the company decided to settle and move on. Time will tell if it was the correct decision or not."
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Still, the company stands by its ingredient science, which Noonan says is competent and reliable. For instance, of its caffeine product claiming to support memory, he says, "If you were to research caffeine and memory, you would come across hundreds of studies connecting memory with caffeine consumption. The ability of caffeine to bolster memory—specifically, working memory—isn’t even still a debate." The same, he says, goes for the company’s immunity claims. "How about an immunity claim for a product containing 100% vitamin C, 1000 IU of vitamin D, along with zinc, selenium, vitamin A, and vitamin E? One would logically deduce that among the thousands of scientific studies connecting these nutrients to immune health, there would be no question about a claim for immune health. But, in this instance, the district attorney apparently didn’t consider this evidence sufficient.”

In this case, it seems, the city and district attorneys are holding Neurobrands to a higher standard than what the FTC federally requires. "We would have been tremendously surprised if the FTC or FDA brought a case against us given our strict compliance with the regulations enforced by both agencies," Noonan says. "As for the district attorney for the republic of Santa Monica, it was more confusion rather than surprise." Noonan adds that even after his company, in the midst of the investigation, provided its Neuro Bliss clinical study to the city and county attorneys, the attorneys continued to critique the quality of the research. "After Neuro presented its first clinical trial to the Santa Monica district attorney on Neuro Bliss, it became the most scrutinized of all the drinks. Even with statistically significant results in stress reduction, the DA said the study wasn’t big enough, along with other critiques that had even the study investigators scratching their heads in disbelief.”

"The standard they seem to be requesting is analogous to a Phase II/III drug trial, which doesn’t surprise us based on current trends involving the dietary supplements industry, he says.

Could this case point to a not-so-hidden agenda at the California city and county level against dietary supplement firms? While noting that the state of California, in general, has been "historically very zealous in going after not just dietary supplement companies but the food industry and other industries in California," Al-Mondhiry says this case is "one we’re obviously going to keep an eye on in California."

“It’s alarming in that this clearly goes beyond what FTC allows—FTC’s flexible approach to substantiation,” she continues. “I don’t think it’s going to affect how FTC goes about enforcing its standards, so it’s hard to say how much of a larger impact this is going to have.”

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Meet Your Healthy Soft Drink

Clean-label, better-for-you options are taking over the soft drinks space.

BY INNOVA MARKET INSIGHTS

These days, mainstream products advertise a wide range of health-related marketing claims, like "sugar free," "low calorie," "natural," and "vitamin and mineral fortified," not to mention support for numerous bodily concerns such as immune health, heart health, and oral health. The list goes on. The soft drinks category is no different, and more new products today carry health-benefit claims compared to those that don’t. Nearly 60% of global soft drink launches and up to 75% of U.S. soft drink launches used a healthy positioning of some kind in the 12 months ending March 2016, based on new-product launches Innova Market Insights recorded.

Within the category Innova Market Insights classifies as soft drinks, drink types range from healthy to not so healthy. At one end of the spectrum, there is soda. At the healthier end, there is juice and water, while sports and energy drinks serve many functions beyond hydration. Let’s take a look at some of the latest healthy products in this space.

Healthy Ingredients

Clean-labeling is now a key target throughout the broader food and drinks market. In soft drinks, clean-label claims are relatively high, with over 47% of launches touting one or more claims relating to naturalness, freedom from additives and preservatives, or organic certification.

Organic options are increasingly popular and now make up over 22% of U.S. soft drink launches. Narrowing in, up to 29% of juices/juice drink launches and 44% of iced tea launches are marketed as organic. What’s more, the organic ingredients in juices and juice drinks now extend beyond common fruit varieties to more unusual choices. Examples include Beet Juice from Love Beets; a calamansi citrus juice drink from Vita Mansi’s Original Mansi brand, flavored with organic cane sugar and organic honey; and a line of fruity, açai-based drinks from Sambazon in flavors Açai Berry, Strawberry Lemon & Açai, and Pineapple Coconut & Açai. All of these organic products launched in 2015. Other unusual ingredients seen in organic drinks today include the cruciferous vegetables in Lettuce Tea from Complex Beverages, as well as turmeric in Uncle Matt’s Organic Orange Turmeric Juice.

The ancient grain chia is also branching out in beverages. Most notably, the Mamma Chia food and drink brand recently extended its soft drink line, combining organic chia seeds with green vegetables such as kale, spinach, broccoli, spirulina, barley grass, and wheat grass. The products feature names like Joyful Greens, Grateful Greens, Love Greens, and Soulful Greens. All are non-GMO, gluten-free, vegan, and kosher, as well as organic.

Launched in February, Ocean Spray’s PACT Fruit Infusions drinks offer the benefits of cranberry proanthocyanidins (PACs), with 75% fewer calories than the firm’s traditional cranberry beverages.

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Less Sugar
Ongoing concern over obesity and high sugar intake continues to drive the market for reduced-sugar and diet drinks, also spurring interest in alternative sweeteners. Over 30% of U.S. soft drink launches in the 12 months ending March 2016 used either “no added sugar,” “low sugar,” “sugar free,” and/or “low calorie” or “diet” claims. “Reduced sugar” claims are most popular in juices and juice drinks, used on 30% of introductions. “Low calorie” claims are strongest in flavored bottled water, where they feature on over 63% of introductions, as well as in drink concentrates and mixes (39% of new launches).

Rising interest in sugar reduction and clean labeling gives way to the use of natural sweeteners such as stevia. Now, there is demand for products formulated with organic stevia leaf. Loft Tea’s React, Recharge, and Renew tea drinks and the reformulated Honest Fizz range of zero-calorie soft drinks, which is now entirely organic, launched in 2015 and include organic stevia.

Along with clean labeling and greater transparency, there is also a marked upturn in GMO-free or non-GMO products. In the United States, traditionally there has been only limited consumer resistance to GM foods; still, genetic modification has become more of an issue in recent years. As such, even though the global soft drinks market is not one of the leading categories for non-GMO claims, there is now increased use of these claims in the United States. Over 18% of U.S. soft drink introductions used a non-GMO positioning in the 12 months ending March 2016. The use of non-GMO claims is even higher in juices and juice drinks, rising to over 20%.

Combining Claims
To increase their products’ competitiveness, many soft drink makers use more than just one trending claim. Examples include introductions from well-known companies such as Ocean Spray with its PACt Fruit Infusions, which markets no-added-sugar content, stevia sweeteners, and non-GMO certification; Bolthouse Farms with its 1915 vegetable and fruit juice blend featuring organic, “no added sugar,” and non-GMO claims; and Goodbelly Plus probiotic drinks, which are both organic and non-GMO.

Products like these with a healthy halo will continue finding appeal among consumers shopping for the next generation of soft drink.

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Turmeric is the darling of the natural products market. What have we learned lately about turmeric and its active constituent, curcumin?

BY ROBBY GARDNER
Turmeric, the herb du jour, has long outgrown its reputation as merely a flavorful spice. Promising clinical data plus powerful marketing campaigns heralding turmeric’s antioxidant and anti-inflammatory health benefits have turned this rhizomatous plant into a star. The result? Sales are up—way up. In both 2013 and 2014, turmeric was the number one bestselling herbal ingredient in U.S. natural and health food stores, with more than 30% sales growth in 2013–2014 alone, according to the American Botanical Council’s (Austin, TX) annual HerbalGram U.S. herbal dietary supplement sales report. HerbalGram's report on 2015 herbal sales isn't out yet, but if we were to bet, we'd anticipate similarly stellar results.

Scientists and consumers are now simply fascinated by what turmeric and its active constituent, curcumin, can do for health. But what exactly is all the fuss about? Turmeric's claim to fame is a seemingly unending roster of emerging studies pointing to potential, wide-ranging applications for the golden spice and its extracts. Let’s take a look at some of the latest health indications under investigation. All research described herein concerns the turmeric species *Curcuma longa*, unless otherwise noted.

### Exercise Recovery
Thanks to its anti-inflammatory action, curcumin may be a promising exercise recovery aid. Researchers at the University of North Texas reported that a curcumin extract reduced inflammation markers in adult subjects after exercise.1 Study participants who consumed 400 mg/day of the Longvida brand of curcumin extract experienced a reduced increase in creatine kinase (CK) and inflammatory cytokines after a leg press exercise, compared to a placebo group. Among the curcumin group, researchers observed significantly smaller increases in CK (-48%), TNF-α (-25%), and IL-8 (-21%).

Interestingly, despite a smaller rise in inflammatory markers, researchers noted that subjects didn’t necessarily *feel* any improvement in muscle soreness, based on questionnaires the subjects completed. But, according to Longvida’s supplier, Verdure Sciences (Noblesville, IN), this is not unusual. "Inconsistencies in a reduction in soreness are expected, as soreness is a very subjective measurement," says Sonya Cropper, vice president of marketing and innovation. That may also explain inconsistencies in soreness measures in previous studies on curcumin and exercise. Muscle soreness may not necessarily impact function, but the North Texas study researchers noted that muscle inflammation...
Curcumin lowers body inflammation and contractile ability in adults after exercise. Dilation (the ability of blood vessels to expand) and arterial stiffness are under investigation. The results could complement recent studies involving the National Cancer Institute's assessment of its Meriva curcumin and psoriasis improvement. In the study, curcumin was found to enhance the effect of topical steroids.

In addition, two recently completed studies involving the National Cancer Institute will soon inform the public of any potential benefit of curcumin on radiation-induced dermatitis. The same curcumin extract used in these studies, Curcumin C3 Complex from Sabinsa Corp. (East Windsor, NJ), appeared to reduce this kind of dermatitis in a 2013 study in breast cancer patients.

**CURCUMIN PRODUCT TRENDS**

Ever since science on turmeric and curcumin picked up, manufacturers have increasingly sold turmeric as more than a standalone spice. Now well established in the dietary supplement market, turmeric is taking a turn into ready-to-drink (RTD) products.

In beverages, turmeric has progressed from turmeric milk, a traditionally consumed Indian drink, to a range of modern RTD products containing the spice and/or its extract. Still, there are obvious limitations to the adaptability of turmeric to beverages, depending on the ingredient you use. Turmeric's textural properties, orange-yellow color, and pungent spiciness don't always harmonize with the liquid format or with other ingredients in RTD beverages.

When challenges arise, a different kind of turmeric might do the job. Curcumin expert Sabinsa Corp. (East Windsor, NJ) is one supplier breaking big ground for curcumin in beverages. The company recently introduced UC3 Clear, a soluble *Curcuma longa* ingredient that ultimately prevents residual curcumin from settling at the bottom of a beverage bottle.

You could also try an entirely different turmeric species altogether. Temple Turmeric, which retails more than a dozen different RTD turmeric beverages, says it is the first to market an RTD beverage with *Curcuma mangga*, also known as mango ginger or white turmeric. This species of turmeric may not contain as many curcuminoids as *C. longa*, but it's not without its own health benefits; plus, its fruity aroma and flavor and lighter color suit beverages especially. The remainder of Temple Turmeric's drink line is formulated with the trademarked Hawaiian Oana Turmeric, a domestic variety of *C. longa* that has deep color but is sweeter to taste than conventional Indira yellow turmeric.

According to Temple Turmeric founder and CEO Daniel Sullivan, another trend to watch out for in the turmeric RTD space is a combination of ingredients for gut health. Fermented ingredients, apple cider vinegar, and ginger can complement turmeric's flavor and function. Turning back to the supplements space, while turmeric pills and powders are marketable on their own, manufacturers are also combining turmeric with other complementary nutrients. Omega-3 supplement specialist Nordic Naturals just launched a soft gel product that marries fish oil and curcumin. Other omega-3 retailers are promoting similar formulas, with the presumed intention of increasing the anti-inflammatory potential of their products.
Brain Health
There is also much more to explore between curcumin and brain health. A number of contemporary curcumin studies are focusing on Alzheimer’s disease, with early data hinting that curcumin can help promote the elimination of amyloid protein plaques from the brain.

“Alzheimer’s is thought to be due in part to the accumulation in the brain of protein tangles or plaques, which not only disrupts the transmission of nerve signals but also ends up ‘choking’ the nerve cells,” says Verdure Sciences’ Cropper, whose company’s Longvida extract has been studied in several trials related to this theory. In addition, an ongoing study on Theracurmin curcumin from Theravances Corp. (Tokyo) is utilizing brain scans of elderly subjects to see how this particular curcumin extract may affect the presence of these protein tangles over time.

Long-term environmental stressors can also influence the health of the brain, says Anurag Pande, PhD, Sabinsa’s vice president of scientific affairs. Over time, Pande says, such factors may activate or deactivate certain genes, which may trigger development of diseases like schizophrenia. Fortunately, curcumin may potentially affect epigenetic mechanisms related to inhibition of various diseases such as schizophrenia, he says. Safety and efficacy studies are already underway to assess curcumin’s usefulness alongside antipsychotic drugs, Alzheimer’s medications, and antidepressants. Adults and children are part of the exploration, and exercise is involved in some protocols.

Cancers
Cancers are associated with symptoms of severe inflammation. For this reason, researchers are increasingly considering curcumin’s potential to support cancer therapy.

Notable ongoing and recently completed curcumin studies on cancer include those on Meriva curcumin extract from Indena, as well as BCM-95 curcumin extract from Arjuna Natural Extracts Ltd. (Kerala, India) and Dolcas Biotech LLC (Landing, NJ). Multiple other curcumin suppliers are also engaged in the field. Projects are exploring the safety of curcumin extracts when used by cancer patients, potential harmonization between curcumin and chemotherapy drugs, and changes in overall quality of life with curcumin use. Early data even suggest that curcumin might have an effect on tumor growth. With some luck—and pending significant positive clinical results, of course—the application of curcumin in cancer therapy could be widespread, with potential benefits for patients suffering from prostate cancer, colon cancer, and endometrial cancer.

Decontamination
The golden spice and its derivative curcumin appear to be antibacterial, as evidenced by
recent studies on their effects on pathogens. In these studies, turmeric and curcumin extracts have suppressed growth of undesired food-borne bacteria such as *E. coli* and *S. aureus* and bacteria that are transmitted in healthcare settings. Efficacy may depend on the curcumin extraction method—instance, whether extracted with water versus ethanol—and efficacy may even improve with a fermented turmeric extract. One recent study even found an antibacterial effect with a mere crude turmeric paste. Potential applications for curcumin as an antibacterial agent may include using it as a feed additive for infected livestock, or even sprinkling it on vegetables and meats intended for human consumption. A recent study on the NovaSol curcumin extract from Frutarom Ltd. (Haifa, Israel) took the latter approach, using curcumin to decontaminate cucumber, pepper, and chicken meat for up to 48 hours.

Turmeric isn’t popularly used as an antibacterial agent yet, but it’s already approved as a food additive for coloring purposes in the United States and the European Union.

**Oral Care**

Turmeric’s antibacterial quality can also apply to oral care. Recent studies show antibacterial benefits when curcumin was applied directly to teeth or mixed in media cultivated with periodontal pathogens. Curcumin’s anti-inflammatory properties may also lend other oral benefits. For instance, researchers are exploring whether a turmeric mouth rinse may help relieve chemotherapy-associated mucositis.

The current market for turmeric-based oral care is limited, but more positive data could grow the herb’s popularity in retail mouthwash and toothpaste products.

**Bioavailability**

On a final note, while promising research has been published on turmeric and its extracts, manufacturers need to remember that not all turmeric extracts are the same. The type, bioavailability, absorption, metabolism, and systemic elimination of turmeric nutrients can differ vastly from one supplier’s ingredient to another. In fact, most curcumin suppliers claim that outcomes in certain studies were only possible thanks to their unique curcumin delivery system and its bioavailability benefits. It’s always best to check with individual turmeric and curcumin suppliers to consider published science on their own particular raw materials and extracts, as well as other pros and cons that might motivate a purchase.

View references at www.NutritionalOutlook.com/herbs-botanicals/1606/turmeric

**Robby Gardner** is the former associate editor of Nutritional Outlook magazine.
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Mighty Scavengers

Powerful new evidence for antioxidants in heart and brain health.

BY IRFAN QURESHI, ND

Plants and animals alike have powerful, innate tools for protecting cellular health; among them are the powerful free-radical scavengers, antioxidants. Recent science reveals that many antioxidant compounds play additional, major roles in supporting cell physiology and function. Research, for instance, is now showing that a number of plant anthocyanins, compounds often associated with antioxidant benefits, support various aspects of mitochondrial function within cells, a likely mechanism for their heart-protective benefits. 1 Emerging research furthermore indicates that a number of plant-based compounds directly contribute to the maintenance of telomere length, a reliable predictor of aging and the risk of age-associated chronic diseases. 2

Whatever their mechanisms may be, ingredients falling under the antioxidant umbrella continue to show clinical benefits. New research on olive polyphenols, N-acetylcyesteine, pine bark extract, and CoQ10 indicate that these ingredients support heart health, the vascular system, and the brain.

Olives on the Offense
Polyphenols from olives are known for their antioxidant and anti-inflammatory benefits. European scientists led by Alvaro Hernàez conducted research to assess the benefit of a low-polyphenol versus a high-polyphenol olive oil for LDL cholesterol concentrations and LDL atherogenicity in men. 3 Twenty-five healthy men aged 20-59 years consumed 25 ml/day of a low-polyphenol (2.7 mg/kg) or high-polyphenol (366 mg/kg) olive oil for three weeks.

At the end of the study, plasma levels of apolipoprotein B (apo B-100; a measure of lipoprotein production from the liver) and the number of total and small LDL particles (the most atherogenic of LDL particles) decreased in the high-polyphenol group. Mean decreases in apo B-100 were 5.94%, while the number of total LDL and small LDL particles decreased by an average of 11.9% and 15.3%, respectively. By contrast, the group consuming the low-polyphenol olive oil saw increases in all three measures, indicating the protective nature of olive oil polyphenols for heart and vascular health.

NAC Attack
N-acetylcyesteine (NAC) is an amino acid that is a precursor for glutathione, the body’s master antioxidant. NAC has also been found to reduce homocysteine levels, a risk factor for heart disease. The magnitude of NAC’s benefit has not been studied in a comparative fashion in conditions of elevated oxidative stress, however, such as in smokers and in those with elevated cholesterol.

Recently, Wulf Hildebrandt and colleagues from Germany reanalyzed data from two double-blind, placebo-controlled studies to determine NAC’s impact on plasma homocysteine levels and blood pressure in those with elevated versus normal blood lipid levels, as well as in smokers versus non-smokers. 4 They found that NAC supplementation (1.8 g/day for four weeks) significantly lowered homocysteine levels by an average of 11.7% and decreased systolic blood pressure in all subjects regardless of smoking or lipid status. Additionally, reductions of diastolic blood pressure were seen in those with elevated blood lipids. The authors suggest that NAC should be considered for prevention of vascular events related to high-homocysteine and arterial hypertension.

Pycnogenol Power
Pycnogenol is a unique proanthocyanidin-rich extract from French pine bark that has antioxidant benefits. Gianni Belcaro and colleagues in Italy recently evaluated the cognitive benefits of Pycnogenol in healthy people aged 55-70 with elevated oxidative stress levels. 5

In the study, 150 subjects were screened, and 44 were found to have elevated levels of oxidative stress. Another group of individuals with comparable levels of oxidative stress was followed as a reference. Pycnogenol supplementation (100 mg/day) for 12 months...
significantly improved measures of cognitive function, attention, and mental performance compared to reference controls. Furthermore, measures of oxidative stress were significantly lower (by an average of 28%) at 12 months, with no corresponding change in control subjects. Pycnogenol, therefore, significantly improved cognitive function and lowered oxidative stress in healthy individuals aged 55-70.

CoQ10 for the Heart
CoQ10 is a coenzyme best known for its effects on mitochondrial function and its role in the production of energy as ATP. CoQ10 plays a major role in the health of heart tissue. Recently, Nasim Bagheri Nesami and colleagues from Iran evaluated the anti-inflammatory effects of CoQ10 in individuals with mild hypertension.6

In the 12-week, placebo-controlled study, 60 hypertensive patients were given 100 mg of CoQ10 daily or a lactose placebo. Inflammatory markers were evaluated at baseline and after the 12-week study period. Levels of adiponectin, an anti-inflammatory protein involved in glucose and fatty acid metabolism, were significantly higher in the CoQ10 group than placebo. Additionally, levels of the pro-inflammatory cytokine IL-6 and C-reactive protein significantly decreased, supporting the anti-inflammatory benefits of CoQ10.

References

Irfan Qureshi is executive director, research and regulatory affairs, for Healthy Directions.

The Plant-Based Foods Association (PBFA: San Francisco) went live on March 7 as the first organization to represent, promote, and advocate for this flourishing food and drinks sector. “Every other sector of the food industry—from sugar to organics—is represented in the policy arena,” said Michele Simon, executive director of the Plant-Based Foods Association, in a press release announcing the group’s arrival. “The time has come for the plant-based food industry to also have a collective voice.”

PBFA aims to raise awareness among consumers, retailers, and food-service professionals about the health benefits of plant-based foods. In addition, the association will “work on policies to ensure that plant-based foods are not at an economic disadvantage when compared to their animal-based counterparts,” as is the case with “outdated” food-labeling laws favoring the animal foods industry that don’t work in plant foods’ favor, Simon told Nutritional Outlook. “For example,” she said, “a company that makes a nut-based cheese faces challenges in how to label that food in a way that consumers can easily understand.”

The time for taking a united stand doesn’t come soon enough, because all signs point to more growth for plant-based foods. Notes Kaitlin Barton, director of communications and marketing for PBFA member California Farms (Bakersfield, CA), “The increasing awareness that a plant-based diet is the only truly sustainable option for the future of our planet gives plant-based foods and beverages a natural opportunity. “Couple that with the vogue for eating all things healthful, she says, “and you can see why plant-based foods and beverages are gaining such significant traction.”

Planting the Seed

That traction, according to newly released research from SPINS, the Chicago-based information provider for the natural- and specialty-products industry, clocks in at a robust $3.5 billion in total-market sales (excluding Whole Foods data). That represents more than 8.7% growth over the past two years, whereas same-period growth for the
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general food and beverage sector topped out at just over 3.7%.

Just as important as these impressive sales numbers, though, are the factors underlying them. Per Megan Cleveland, QA/R&D manager, Crunchies Natural Food Company (Westlake Village, CA), consumers are migrating plant-ward for reasons as distinctive as those consumers themselves.

Nutrition frequently tops their lists, she says, as “research on the effects of foods on our health increasingly points to the advantages of a healthy diet dominated by antioxidant- and nutrient-packed fruits and vegetables.” August bodies ranging from the American Heart Association to the United Nations have come to a similar conclusion, all acknowledging the benefits of plant-based diets both for individuals and for the environment.

And, adds Monica Klausner, cofounder and CMO, Veestro (Newbury Park, CA), a gourmet plant-based meal-delivery service, that environmental dividend “makes it easier” for contemporary consumers attuned to such issues “to take part in this movement.” Also, because being plant-based “has a clean and healthy feel,” Klausner says, “it conveys a ‘going back to nature’ attitude that people are embracing again.”

This embrace isn’t all high-minded altruism, of course. The search for convenience, value, and an honest snack all play in plant products’ favor. As Paul Albrecht, vice president, Simply 7 Snacks (Houston), says, “Consumers are looking for easy ways to incorporate more organic foods into their diets at an affordable price, and they’re looking for quick, grab-and-go foods that are minimally processed.” Plant-based products fit that bill.

And if nothing else, says PBFA’s Simon, “We hear from consumers who just like the taste. That’s the best reason of all, because appealing flavors are what will keep them coming back.”

What’s in a Name?
Keeping plant-food customers coming back is no small feat in an age when meat, meat, and more meat has captured so much of the spotlight. (Thank you, Paleo diets.) In light of those circumstances, the success of the plant-based movement may signal either a backlash against the cavepeople or a degree of cognitive dissonance that’s noteworthy even in our contradictory culture. But Cleveland sees Paleo and plant diets as two sides of the same coin, “playing off each other well in that both promote eating a healthy, whole-foods diet that’s as unprocessed as possible.”

For plant-based foods, there’s also a catch: all plant-based products aren’t necessarily healthy, whole, or unprocessed. As evidence, look no further than the garden-variety potato chip, a plant-based product right down to its corn-based frying oil, but hardly a paragon of nutrition. And that raises fundamental questions about what plant-based actually means—and, for that matter, how it differs from the longer-standing term vegetarian.

Linda Barron, CEO, Steaz, a brand of The Healthy Beverage Company (Doylestown, PA), sees it this way: “Vegetarian is a way of life,” she says. “It’s a belief system that isn’t always about health.” By contrast, plant-based eating emphasizes health and is “about choosing food that’s as close to its natural state as possible,” she says.

Further, although some insist that plant-based products must exclude ingredients derived or extracted from meat, poultry, dairy, or other animal sources—a notion that other observers pointedly reject—most do agree that while plant-based formulations might be restrictive, plant-based diets aren’t. Says Simon, “For some consumers, vegetarian can sound negative. In contrast, plant-based is a more accurate description of this growing sector, which appeals to all consumers simply looking for great-tasting, healthier foods.”

Who’s Buying Now
These days, those consumers include a lot of people. But they may not be the ones you suspect. As Sam Shehayeb, CEO, Flamous Brands (Duarte, CA), observes, “We know it’s not just vegetarians buying plant-based foods. We receive feedback from customers all the time and personally notice an audience that appreciates the product for what it is.”

Ripple is a new pea-protein milk retailing at select Whole Foods outlets nationwide and at Target stores this summer. The company says the product has the “creamy and smooth flavor that makes milk gratifying.” Most importantly, Ripple provides the same 8 g of protein per serving as dairy milk.
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In other words, plant-based foods aren’t just for hippies or hipsters. Millennials in particular gravitate plant-ward, as the demographic is “very connected to the way nutrition affects their health and also concerned with environmental sustainability,” Veestro’s Klausner says. “So they’re a big driving force behind the plant-based movement.”

Simon notes that surveys show “it’s increasingly ‘flexitarians’ or ‘reductarians’ who are opting for plant-based foods.” That, she believes, “is really where the growth potential is to reach mainstream consumers who simply want to reduce their animal-food intake.”

And plant-based products may find their largest pool of prospective proponents on social media, where taste, health, and environmental concerns converge into energetic dialogue and evangelism for the plant-based movement,” says Califia Farms’ Barton. This convergence opens up massive entryways for consumer adoption of plant-based products.

**Their Favorite Things**

One thing consumers love about plant-based eating is that they “don’t have to change their entire lifestyles to incorporate most plant-based products into their diets,” Steaz’s Barron says. One reason they needn’t do so is that marketers are stocking shelves with everyday foods and beverages that consumers would have chosen anyway; the only difference now is their plant-based bona fides.

For example, salty snacks promising the satisfaction of the platonic potato chip but from more virtuous vegetables are enjoying “strong growth,” Simply 7’s Albrecht says. “Veggie” snack chips account for more than $55 million in annual revenue in the natural and grocery channel and represent more than 40% of “other snacks” category sales, according to SPINS data.

Cleveland of Crunchies Natural Food notes that “a number of new products in the chip and snack category emphasize pulses and root vegetables,” while bars are taking advantage of the popularity and functionality of ancient grains and hemp and chia seeds. “The beverage category is showcasing antioxidant-rich superfoods such as green tea and açaí,” she continues, “as well as probiotics in fermented products like kombucha.” Even nondairy variations of cheese, milk, and ice cream “show innovation in value-added, healthier, allergen-friendly options based on plant ingredients such as fruits and nuts.”
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Behind-the-Scenes Challenges

That nondairy milk category is especially frothy, with plant-based milks and almond milk in particular "experiencing huge growth right now, accounting for 65% of sales in the alternative-beverage segment," Simon says.

One of the key ingredients consumers crave in these drinks is plant-based protein. Jason Hull, associate brand manager for the new Evolve brand (Benicia, CA) from CytoSport, the long-time maker of the Muscle Milk whey protein line, notes that the Evolve product prioritizes plant protein, and pea protein specifically, as a "sustainable protein source that should make our consumers feel good about their decision." Peas are a companion crop and "help bring needed nitrogen back to the soil so that future crops can prosper," he explains.

But while pea protein’s healthy halo has been buffed to a high shine, its flavor profile still needs a little work. Hull cites “taste, taste, and taste” as the biggest challenge his team faced in formulating the beverages. That said, as protein processors refine each new generation of plant-based ingredients, their hedonics are getting better, Hull says, “and we feel our R&D department nailed it” with this latest launch.

The winding path it took, however, highlights the contrast between plant-based products’ smooth landing on the market and the bumpy sourcing, formulation, and processing ride that got them there.

Just blame Mother Nature. "Natural products will always have seasonal variations that affect product quality, flavor, color, texture, and availability," Cleveland says. “This can be caused by weather patterns, pests, water availability, and more.” Her company tries to minimize those variables by shortening the lag between fruit and vegetable harvest and the freeze-drying that creates its Crunchies products. Doing so “ensures the highest quality and greatest nutrient retention,” keeping the quality of the finished items consistent.
Consumers are increasingly searching for gluten-free foods. That’s why GPC is increasingly supplying gluten-free ingredient solutions. Our technical experts have created proven trial formulas for a wide range of gluten-free applications, from quick breads and yeast breads, to cookies and cakes, even doughnuts. Using corn-based functional starch ingredients, we’ve developed innovative, customizable solutions to many traditional problems, including those of texture, shelf life and product volume. If you have a gluten-free challenge, it’s likely we’ve already found a solution. All you have to do is ask.

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Meanwhile, Austin Allan, “totally important officer,” or TIO, of RTD soup brand Tio Gazpacho (New York City), concedes that “our product does vary a little from batch to batch” because it relies on “only fresh ingredients” as its foundation. But the company “embraces” those differences because they reflect the product’s freshness, he says. “The last thing we want to do is put out a product that tastes exactly the same every time because we add flavorings to even out natural variability.”

Processors must also account for the sensitivity to light, heat, oxygen, pH extremes, and other exigencies that are par for the course in products designed without artificial stabilizers, preservatives, and other additives. Michele Silbey, marketing and communications manager, nutpods (Newport Beach, CA), notes that her company leans on “some naturally derived stabilizers” to “encourage consistency” in the dairy-free creamers it makes. But even so, exceptionally hot or acidic coffee can cause separation and feathering in the product—which consumers report back to them. That input helps drive R&D efforts, Silbey says, but “at the same time, we wouldn’t want a product that’s always perfect in any environment,” as that usually means “it has lots of chemicals and unhealthy ingredients.”

And before processors can even worry about process tolerance and product performance, they have to source the clean, sustainable, transparent, and appropriately certified plant-based ingredients necessary to make their plant-based products. And that remains a work in progress. “Sourcing plant-based ingredients is certainly manageable,” Steaz’s Barron says, although obtaining certifications may add lead time to sourcing, “especially in the beginning.”

Where the system breaks down is in achieving scale. “Greater consumer awareness has led to rapidly increasing demand,” Barron says, “so sufficiency is being challenged.” And as of right now, she observes, “it appears that demand will continue to outpace supply” for some ingredients.

**Getting Buy-In**

Those are the headwinds that manufacturers face in getting plant-based products to market. But what barriers to the market are still in place? The primary one Cleveland sees is price. “Processed, nutrient-poor foods tend to be cheap,” she notes, though their costs to long-term health “arguably outweigh the sticker price.” So she finds it unfortunate that consumers today pay a higher price for plant-based foods.

That raw deal grates even more when pricey plant-based products don’t even taste good. This is why processors are wise to make flavor work in their favor, in order to build a following. “I think bold flavors associated with more indulgent snacks are always a big hit,” says Poorvi Patodia, founder, Biena Foods (Allston, MA). The dairy-free Rockin’ Ranch flavor the company debuted at this year’s Natural Products Expo West trade show in Anaheim, CA, quickly became the chickpea snack line’s second-best seller. “I think it’s because people like the idea of not having to compromise between healthy and tasty,” she says.

Tio Gazpacho’s Allan predicts that “a lot of consumers, and not just plant-based ones,” will pull away from sticky-sweet profiles and move toward savory, even in applications that have traditionally courted the sweet tooth in us all. “Already,” he notes, “you’re seeing savory bars, yogurts, and, now with us, bottled soups.”

So with culinary creativity setting the pace in plant-based kitchens, opportunities for more plant-based concepts are thriving. As Veestro’s Klausner says, “Consumers are surprised at the variety and deliciousness of plant-based products compared to previous experiences. The new ways in which old products are prepared and sold has made it easier for consumers to adopt plant-based eating.” With so much on the table, we’re ready for a plant-food takeover.

*Kimberly J. Decker writes for the food and nutrition industries from her base in the San Francisco area, where she enjoys eating food as much as she does writing about it.*
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Preservatives

Up to the Fight?

Can natural preservatives really knock out mold, yeast, and bacteria?

BY MAUREEN KINGSLEY

Preservatives, particularly food preservatives, have been around many thousands of years. For nearly all of recorded history, humankind has sought strategies for keeping foods safe and edible for longer periods of time. Some of the earliest food preservatives were salt, sugar, vinegar, and spices. Modern food preservatives include such chemical compounds as benzoates, nitrates, sulphites, and sorbic acid.

The shared goal of all food-preservation efforts (and those for cosmetics and some pharmaceuticals as well) is to create an environment that is unwelcoming to such microorganisms as mold, yeast, and bacteria. An additional purpose of preservation, says PLT Health Solutions’ (Morristown, NJ) senior food technologist Shadi Riazi, PhD, is to retain “the natural characteristics of food.” Shaheen Majeed, marketing director, Sabinsa Corp. (East Windsor, NJ), adds that preservatives must be “safe and stable, and must not disturb the flavor and palatability of foods.”

Increasingly, manufacturers are seeking naturally sourced preservatives as consumer demand for minimally processed and clean-label products increases. “Any safe and non-synthetic compound derived from natural sources—animal, plant, microbial—with the ability to enhance the shelf life of food products and retard their deterioration can be considered a natural food preservative,” Riazi says.

But are natural preservatives truly up to the difficult task of meeting myriad preservation requirements? Indeed, they are. Below, we highlight some of the most popular and effective natural preservatives available. For more on how natural preservatives stack up next to synthetic alternatives, turn to page 74.

Rosemary Extract

All three natural-preservative suppliers contacted for this story point to rosemary extract as being an effective, versatile product for food preservation and even cosmetic/cosmeceutical preservation. “Rosemary extracts provide natural antioxidant functionality that prevents lipid peroxidation of unsaturated fats and oils,” explains Riazi. “They...
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Preservatives

Rosemary is a well-known natural preservative. It can prevent rancidity and provide color and flavor stabilization in a wide range of food products. His company, PLT, offers a number of rosemary-based preservatives, including standardized rosemary extracts, specialty rosemary ingredients, and customized natural antioxidant/preservative blends.

Likewise, Sabinsa’s Majeed cites rosemary extract containing rosmarinic acid as being “one of the most promising ingredients in the food industry.” He adds that the extract’s “antioxidant mechanism of action has been reported to be the key benefit in use as a food preservative.”

Kemin (Des Moines, IA) counts rosemary extract among its key offerings as well. It and other natural plant extracts supplied by the company “help delay color and flavor degradation and are label-friendly,” says Courtney Schwartz, Kemin’s senior marketing communications manager, food technologies.

Ingredient blends, like those containing green tea, are often more effective.
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Combination Products
Natural-preservative suppliers have also found that combining and blending multiple plant extracts into unique formulations can amplify preservative power over single-source preservatives. “We have found great synergies among our plant extracts when used in combination,” Kemin’s Schwartz explains. “Our unique blends of rosemary and green tea as well as rosemary, green tea, and acerola are more effective at extending the color and flavor of meat and poultry products than rosemary alone.” Additional food applications for these preservative blends include fats, oils, dressings, sauces, and beverages, Schwartz adds.

Sabinsa’s Majeed points to the value of combination plant-extract blends for preserving cosmetics and cosmeceuticals as well. “With each extract having different mechanisms of action and activity against different microbes, blends with a combination of more than one extract or essential oil act as potent natural preservatives,” he says.

Buffered Vinegar
A buffered-vinegar solution is another natural, label-friendly choice for preserving meat and poultry products while improving pathogen control.

Kemin’s BactoCEASE NV buffered-vinegar product targets such bacteria as *Listeria monocytogenes* by inhibiting their growth. It also extends foods’ shelf life and has no negative impact on the texture or flavor of the finished food product. “This solution is a label-friendly alternative to traditionally used synthetic preservatives, such as sodium lactate-diacetate,” Schwartz states, “and offers an ingredient recognizable to consumers while it extends product shelf life by delaying the growth of spoilage bacteria.”

When it comes to blocking unwelcome visitors, these natural preservatives are more than tough enough.

**Preservatives**

Vinegar buffered with ingredients like sodium or potassium to neutralize acidity is another clean-label preservative option.

Maureen Kingsley is a freelance writer, editor, and proofreader based in Los Angeles. She covers a variety of industries, including medical technology, food-ingredient manufacturing, and cinematography.
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This April, at its World Health Day celebration, the World Health Organization (WHO) took the unprecedented step of releasing its first Global Report on Diabetes. The report highlights the need to increase both prevention and treatment of the disease, in light of finding that the number of people with diabetes has nearly quadrupled since 1980 to reach 422 million adults worldwide (about 8.5% of the population), most of whom live in developed countries. WHO cited overweight and obesity as driving this increase.

"High blood sugar levels are not an isolated condition," says Mitch Skop, senior director of product development at Pharmachem Laboratories Inc. (Kearny, NJ). "Ignored and unattended, it can lead to heart attack, stroke, kidney failure, blindness, and limb amputation." According to the WHO report, diabetes caused 1.5 million deaths in 2012, as well as an additional 2.2 million deaths by increasing the risk of cardiovascular and other diseases. About 40% of these deaths could have been prevented, WHO estimates, through better prevention and treatment.

**Targeting Carbohydrates**

In an effort to help diabetes patients and at-risk individuals manage their blood sugar levels, researchers and formulators alike are focusing on carbohydrates.

"Leading scientists and academics worldwide agree that there is convincing evidence that eating a low-glycemic diet while still going for a carbohydrate-rich diet in the long run reduces the risk of type 2 diabetes and helps to control blood glucose in people with diabetes," says Jon Peters, president of Beneo Inc. (Morris Plains, NJ), citing a study recently published in *Nutrition, Metabolism & Cardiovascular Diseases*. The study found that the glycemic index (GI) was a valid and reproducible method of classifying carbohydrates, and that low-GI diets were relevant to the prevention and management of diabetes. Further, researchers confirmed that a low-GI diet should be considered in the context of quality carbohydrates like fiber-rich options and whole grains.

In the nutraceuticals industry, this could translate to opportunities for growth in functional foods. "With increasing challenges placed on society by diet-related diseases such as impaired glucose tolerance and diabetes, there is increased emphasis on food and drink producers to develop new, lower-glycemic-response products and make them available and easy to identify for consumers," adds Peters. "Ingredients that help lower the glycemic load of products and levels, while maintaining taste and texture, will become more relevant in new product formulations."

Along these lines, Kamut International (Missoula, MT) recently found that its Khorsan wheat products can positively impact blood insulin and glucose. In the study, two different products were supplied to volunteers with type 2 diabetes: products made with ancient Kamut grain and products made with modern wheat. Each participant was required to eat both the ancient-
modern-wheat products, but in two separate eight-week periods. They were instructed not to change their diet or lifestyle habits, or any use of medications. Blood glucose levels taken at the beginning and end of each trial period found that Kamut wheat produced a significant improvement in key markers in the blood, including glucose (-9.1%) and insulin (-16.3%). No significant effect was noted after consumption of the modern-wheat diet. “As far as the nutraceutical industry goes, it may give much added support to their claim that superfoods may be more important than synthetic drugs in addressing long-term effects of chronic disease, in addition to mediating that disease as well,” adds Bob Quinn, PhD, organic farmer and founder of Kamut.

At Ingredion Inc. (Bridgewater, NJ), ingredient research is evolving to address carbohydrate metabolism and its long-term effects on glycemic health. Two studies published since 2015 each examined the effects of high-amylose corn resistant starch (branded as Hi-Maize at Ingredion) on insulin sensitivity and carbohydrate metabolism.

The first study evaluated the effects of high-amylose corn resistant starch on insulin sensitivity in women. Among the participants—generally healthy overweight and obese women with insulin resistance—insulin sensitivity was increased by 16% following consumption of 30 g/day of resistant starch compared to the control.

The second study examined the chronic effects of consuming bagels fortified with Hi-Maize on glycemic markers in adults at increased risk of type 2 diabetes. Researchers found that post-treatment insulin resistance was significantly lower for the fortified bagel compared to the control wheat bagel, concluding that consumption of high-amylose resistant starch can “improve glycemic efficacy by reducing the amount of required insulin to manage postprandial glucose while also improving fasting insulin sensitivity,” explains senior manager of nutrition marketing Santiago Vega.

**Whole-Body Approaches**

Because blood sugar levels have far-reaching effects throughout the body, some researchers are expanding beyond precision approaches in favor of holistic approaches.

New research coming out of the North Carolina Research Campus showed that two compounds in ginger were able to stop the physiological processes that lead to diabetes-related heart, kidney, eye, and neurological complications. “Our study demonstrated that the two major bioactive ginger...
Blood Sugar Support

components, 6-gingerol and 6-shogaol, have the potential to prevent diabetic complications via trapping reactive dicarbonyl species, such as methylglyoxal (MGO),” said lead researcher Shengmin Sang, PhD, associate professor of functional foods at North Carolina Agricultural and Technical State University. Since MGO levels in diabetic patients are about two- to six-fold higher than those in healthy subjects, and because MGO is known to induce protein glycation and diabetic complications, Sang believes that trapping MGO is a good strategy to prevent those complications. In fact, within an hour, the ginger compounds trapped about 10% of the MGOs present, without the side effects common to prescription diabetes medications (stomach upset, skin rashes, dizziness, weight gain, etc.).

At HP Ingredients (Bradenton, FL), blood-sugar management developments are centered around mitigating metabolic syndrome, a group of risk factors correlated with heart disease, stroke, and diabetes. One placebo-controlled trial of 107 patients exhibiting metabolic syndrome showed that those taking 650 mg of bergamot polyphenolic fraction twice daily for 120 days had a significant reduction in serum total cholesterol, LDL-C, and triglycerides. "Bergamot polyphenolic fractions found in Bergamonte activate AMP kinase (AMPK),” explains HP Ingredients’ CEO, Annie Eng, of the branded ingredient, which “plays a central role in regulating glucose metabolism and energy production.”

Phase 2 Carb Controller, an ingredient from Pharmachem Laboratories, also shows promise for metabolic syndrome by optimizing glucose absorption. "Regarding Phase 2, interestingly, blood sugar impact seemed to be an initial ‘side effect’ we noticed in our trials that focused on weight and fat loss,” explains Skop. "Theoretically, it made sense that by curtailing carbohydrate absorption to a degree, blood sugar levels would also be correspondingly lower. The impact we see is getting out of a singular mindset and instead providing solutions that support the intimately integrated issues related to long-term, high-circulating blood sugar.”

BioHarvest Ltd. (Rehovot, Israel) recently announced preliminary clinical results on its flagship product, Vinia, a red grape powder that contains a complex of polyphenols (40 mg), including resveratrol (5 mg). "There is active research to show that oxidative stress impacts people with diabetes and that antioxidants can help ameliorate these toxic cellular byproducts,” says the company’s scientific consultant, Stuart Cantor, PhD. Preliminary results show that the antioxidant properties of Vinia can also promote healthy blood circulation, a problem for diabetics.

Going forward, areas of interest include slowly digestible carbohydrates, minimizing inflammation, and integrated approaches that target metabolic syndrome as a whole. But one common thread aligns them all, says Eng. "We can look forward to more
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A NEW PATH FOR PROBIOTICS?

Probiotics are most commonly credited with boosting immune and digestive health. But new research found that Nutraceutix's (Redmond, WA) Lactobacillus reuteri probiotic strain not only enriched gut microbiota, it also modified gut production of protein factors that increase insulin secretion.6

For four weeks, participants took L. reuteri or placebo tablets daily. Those taking L. reuteri exhibited increased glucose-stimulated insulin secretion by 49%, C-peptide secretion by 55%, GLP-1 release by 76%, GLP-2 release by 43%, and altered beta-cell function, compared to those taking placebo. In a related presentation before the American Diabetes Association, the study's primary researcher concluded that "probiotic treatment may improve incretin-mediated beta-cell function, which could be beneficial for the treatment of glucose intolerance or overt type 2 diabetes."

"I have not heard of any further trials related to probiotics in management of blood sugars, though I imagine there may be some findings that come from other metabolic trials," says Nutraceutix's director of quality assurance and corporate services, Tony Blanch. "As more well-defined and -controlled research is conducted, we will be able to provide sound empirical evidence to the body of knowledge surrounding probiotic activity in the human ecosystem."

ingredients being powerfully validated through clinical trials, and the message will be clear to the public: If you want to be healthy, eat a nutritious diet, exercise, and take scientifically validated supplements to regain or maintain blood sugar efficiency.7

Melissa Kvidahl is a freelance journalist and copywriter specializing in the health and wellness industry.

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The beauty market is undergoing a facelift as consumers shy away from synthetic ingredients. Beauty brands are now experiencing the same demand for natural ingredients that the food, beverage, and supplement industries are seeing.

Today, both “beauty-from-within” ingestible products and topical skincare and cosmetic products are increasingly formulated with natural, “clean,” and sometimes organic ingredients to address such beauty concerns as cellulite, skin moisture and elasticity, and skin aging. From collagen and melon juice extract to astaxanthin, lutein, and turmeric rhizome derivatives, here are some ingredients currently under the microscope for potential beauty benefits.

Beauty from Within: Ingestible Ingredients

Collagen

The biggest buzz in ingestible beauty formulations seems to center around collagen. Mai Nygaard, global director, Peptan portfolio, for ingredient supplier Rousselot (The Netherlands), cites a February 2015 Global Industry Analysts’ report forecasting that the nutricosmetics market will reach $7.4 billion by 2020, with collagen being one of the market’s most significant drivers. The Asia-Pacific region, the United States, and Brazil are key markets, Nygaard adds.

Rousselot’s own Peptan collagen ingredient has been clinically shown to “restructure the collagen network in deep skin layers,” Nygaard says, basing her comments on a September 2015 study published in the Journal of Cosmetic Dermatology. In this study, researchers found that Peptan collagen peptides significantly improved skin hydration after two months of oral supplementation—an effect attributed to the stimulation of hyaluronic acid production, Nygaard says. Peptan can be used in beauty beverages, bars, and gummies.

Another recent collagen study, this time on Verisol collagen peptides from Gelita (Sergeant Bluff, IA), examined collagen’s benefits for cellulite. In the Journal of Medicinal Food, researchers concluded that “long-term therapy with orally administered bioactive collagen peptides leads to an improvement of cellulite and has a positive impact on skin health.” Lara Niemann, Gelita’s marketing director, Americas, explains that “over the course of the six-month Verisol supplementation [2.5 g daily], a statistically significant reduction of the cellulite score (‘pinch test’) was observed, starting at three months and appearing more pronounced after six months.” Niemann adds that in three-dimensional skin-surface profile measurements, “skin waviness” was also reduced, and, “remarkably, skin tissue became measurably more dense, indicating a strengthening of the connective tissue.”
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Verisol collagen, used in both supplements and functional foods and beverages, is highly digestible and bioavailable, and is suitable for allergen-free, gluten-free, and clean-label finished products, she says.

A third collagen supplier, BioCell Technology LLC (Newport Beach, CA), plans to publish new beauty-from-within data related to its ingredient later this year, says president Suhail Ishaq. His company’s BioCell collagen ingredient was the focus of a study published four years ago in *Clinical Interventions in Aging* that concluded that 1000 mg taken daily resulted in skin that appeared less dry and with reduced fine lines and wrinkles in the study’s participants. “Additionally, both collagen levels and blood circulation were improved,” Ishaq says.

**Botanicals**

Botanical-based ingredients are a perfect fit for natural-minded beauty shoppers. Like collagen, these ingredients continue to turn up in ingestible beauty products.

A relative newcomer to the U.S. market is Bionov’s (Avignon, France) melon juice extract, marketed as cellulite-fighting SOD B Dimpless, suited for capsules, tablets, softgels, instant drinks, gummies, candies, and bars. The ingredient is already included in a number of finished food products in Europe, but now it is making its way into U.S. launches, such as ThinkItDrinkIt SOD B Dimpless supplement powder, a neutral-tasting supplement designed for stirring into beverages.

A randomized, double-blind, placebo-controlled clinical study published in October 2015 in the journal *Phytothérapie* saw a significant visual reduction of cellulite on thighs by 9.5% after 28 days of oral supplementation with SOD B Dimpless (40 mg/day, or 480 IU/day). “Clinical efficiency is maintained and even emphasized after 56 days of supplementation, with a significant reduction of cellulite on thighs by 11.3%,” according to Bionov’s press release about the study. Sébastien Le Quéré, Bionov’s product manager, says a new website introducing the ingredient will be launched this summer.

**Antioxidants**

Astaxanthin, a carotenoid found in algae, is being used in beauty-from-within products to improve skin moisture and elasticity, and to reduce wrinkles. “Studies have shown that oral supplementation with natural astaxanthin provides protection to all layers of the skin,” says Joe Kuncewitch, national sales manager, AstaReal USA, a supplier of astaxanthin. “Natural astaxanthin is the most powerful antioxidant known to science, and it has the ability to optimize the health and radiance of the skin by providing protection and support to all layers. We see this market for both men and women, regardless of skin type, continuing to expand as baby boomers and millennials strive to maintain a healthy,
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Beverly Kuncewitch, an industry expert, adds that "the key to ageless appearance" is the use of antioxidants and other ingredients. "Real astaxanthin is available as an extract oil, a water-soluble extract, and an extract powder. Applications include yogurt, nutritional bars, chocolates, and beverages."

The antioxidant lutein, found naturally in green leafy vegetables, is well known as an eye-health supplement but may also be gaining traction as a beauty-from-within ingredient for skin appearance. Natrol, a vitamin and supplement manufacturer that uses lutein in its formulations, is "acting on clinical research that reveals that the intake of 10 mg of clinical-strength lutein can help to improve skin hydration and elasticity," according to Michelle Baron, the company’s brand manager of innovation. "It helps protect the skin against visible signs of aging caused by the sun and exposure to the environment."

Natrol's new Skin, Hair & Nails supplement contains 10 mg of lutein per pill, along with collagen, hyaluronic acid, biotin, and other antioxidants. "Consumers are paying more attention to the quality of their beauty ingredients and looking for more-natural solutions," Baron says. "They are more attuned to the fact that what they consume can have a profound effect on how they look and feel."

MSM
A recent study published in November 2015 in Natural Medicine Journal suggests that the ingredient methylsulfonylmethane (MSM), already widely available in joint-health formulations, is useful for improving skin health and appearance when ingested. The randomized, double-blind, placebo-controlled pilot study concluded that supplementation with Bergstrom’s OptiMSM supplements led to significant improvements in skin appearance and condition as evaluated by expert grading, instrumental measures, and participant self-assessment.

"Although the mechanism of action is not well understood," the study’s authors write, "it is apparent that MSM does work at altering expression of key genes that affect moisturization and barrier function, extracellular matrix production, and inflammation control." They conclude that "MSM taken orally may be beneficial for skin health and the reduction of fine lines and wrinkles, though..."
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further research is warranted in broader populations.”

Rodney Benjamin, director of technical development for Bergstrom Nutrition, says, “As we continue to unlock more information about MSM’s complex mechanism of action, we find that oral supplementation in simplistic terms can modulate the body’s oxidative and inflammatory status. As the study suggests, this can help protect the skin from premature aging by reducing fine lines and wrinkles and improving texture. This application is true ‘beauty from within.’”

From the Outside In: Natural Ingredients for Topical Beauty

Ingredients derived from nature, such as eggshell membrane, probiotics, collagen, and botanicals, are trending in the topical-beauty-products space. Biova’s (Johnston, IA) BiovaDerm ingredient, for instance, is derived from water-soluble egg membrane and contains collagen, elastin, desmosine, isodesmosine, and glycosaminoglycans. This combination reduces the appearance of fine lines and wrinkles, the company says, and “recent in vitro studies [of the product] have documented the expression of critical skincare nutrients,” according to Biova’s president, Matt Stegenga. Of the ingredient’s studies now completed and being prepared for publication, he says “one piece of data we can share is that one study confirmed our previous open-label findings, which support the reduction of the appearance of fine lines and wrinkles within weeks [when the BiovaDerm product is topically applied]. While still emerging, this ingredient shows tremendous promise of becoming the next skincare powerhouse.”

Probiotics company Ganeden Biotech (Cleveland) recently announced the inclusion of its Bonicel ingredient in GundryMD’s new topical product, Correct + Calm Redness Relief Cream, which also includes peptides, tiger grass stem cells, and myrrh. Bonicel, introduced by Ganeden in 2012, is the trademarked name of the supernatant produced during the fermentation of the firm’s flagship GanedenBC30 (Bacillus coagulans GBI-30, 6086) shelf-stable probiotic ingredient.

Bonicel itself is not a probiotic, but a probiotic derivative. Mike Bush, senior vice president, Ganeden, calls Bonicel “the first science-backed probiotic-derived skincare ingredient shown to significantly improve the appearance of seven common signs of aging and is optimized to contain the perfect combination of naturally derived metabolites.” Those seven signs of aging are fine lines and wrinkles, enlarged pore size, redness, roughness, dryness, and decreased elasticity. Bush also shares that in a not-yet-published gene-regulation full-thickness skin-model study, Bonicel was found to increase the expression of a gene relating to collagen production. This, he says, provides further support for the claim that Bonicel may have skin-firming and anti-wrinkle activity.
An Innovative Whole-Fruit Cucumber Extract, with Significant Nutritional Benefits for Muscle and Joint Health.
The ingredient has been used in a variety of topical applications, including Murad and Healthy Directions skincare products, and can be incorporated into lotions, creams, soaps, shampoos, and other personal-care products.

Shaheen Majeed, marketing director for Sabinsa Corp. (East Windsor, NJ), a manufacturer, supplier, and marketer of herbal extracts, cosmeceuticals, minerals, and dietary supplements, calls the topical use of probiotics “an interesting new trend with incredible potential.” He says the company’s LactoSpore shelf-stable probiotic is being incorporated into soaps, bath salts, haircare products, and creams.

Majeed also singles out Sabinsa’s Sabi-White ingredient, a colorless natural extract derived from turmeric (Curcuma longa) rhizomes, as demonstrating clinical potential for hyperpigmentation disorders. “Tetrahydrocurcumin is one of the major metabolites of curcumin,” Majeed says. “This is valued as a topical antioxidant and anti-inflammatory agent with superior free-radical scavenging and lipid-peroxidation-inhibition efficacy as compared to vitamin E.” Demand for this ingredient is high in Southeast Asia, Majeed adds.

Maureen Kingsley is a freelance writer, editor, and proofreader based in Los Angeles. She covers a variety of industries, including medical technology, food-ingredient manufacturing, and cinematography.

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Will Consumers Learn to Love Prebiotics?

Consumers may still be relatively unaware of prebiotics, but suppliers believe this potent powerhouse will one day get the attention it deserves.

BY KIMBERLY J. DECKER

Once consumers wrapped their heads around probiotics, it was only a matter of time before the “good gut bugs” became a bona fide phenomenon. So the conventional wisdom on prebiotics—the plant fibers that feed those good gut bugs—was that they’d follow a similar gilded path to mainstream popularity. After all, fiber on the whole has seen its star rise thanks not just to its undisputed health benefits but to the ease with which manufacturers can now add it to everything from waffles to water. So consumers have every reason to pay attention to prebiotics.

“Unfortunately,” says Mark Thurston, president, AIDP Inc. (City of Industry, CA), “they aren’t paying enough attention.” Research his company commissioned found that only about 30% of participants “had some understanding around prebiotics and their health benefits”—which is a slim slice of the consumer-attention pie, at best.

But viewed another way, it’s also evidence that the prebiotic sector has room to grow. And grow it will, industry watchers insist. As prebiotic science continues to mount, and “with more probiotic products adding prebiotics for better and faster effectiveness,” Thurston says, “eventually the message will get out that prebiotics are necessary precursors for probiotics, acting as a ‘fertilizer’ of sorts to prepare the gut to use probiotics most effectively.”

Gut Punch
Prebiotics could do worse than serve as “gut groundskeepers” these days. That’s because gut health is definitely a thing. As Julio R. López, PhD, nutritional research and innovation manager, WILD Flavors & Specialty Ingredients (Chicago), says, Mintel data show that three out of four Americans rank maintaining a healthy digestive system as “very important,” and that the number of new-product launches bearing digestive-health claims rose a whopping 75% globally in 2010–2014.

“As consumers become more conscious of their overall health, they’re adopting a holistic approach that includes watching their diets, exercising more, and taking a preventive stance” that leads them to fiber, López says. “With 70% of the body’s immune system residing in the digestive tract, maintaining digestive health is crucial to the body’s overall wellbeing.” Indeed, none other than the National Cancer Institute reports that increased intake of dietary fiber correlates with lower risk of cardiovascular-, infectious-, and respiratory-disease deaths.1

Not Your Average Fiber
And this is just garden-variety fiber we’re talking about; the prebiotic variety offers yet an entirely additional set of health-and-wellness benefits of its own. What are they? Richard Staack, PhD, MBA, vice president, research and commercial development, Prinova USA (Carol Stream, IL), lists among prebiotics’ “useful properties” the “stimulation of intestinal transit; change in colonic microflora contributing to normal stool consistency and the prevention of diarrhea and constipation; a reduction in the level of triglycerides in blood and the liver; and improved nutrient absorption and production of B-complex vitamins”—all of which, he adds, “collectively leads to improvements in the immune system.”

But while all prebiotics are dietary fibers, it doesn’t necessarily follow that all dietary fibers are prebiotic. The seminal work2 on

The Jerusalem artichoke is a well-known, rich source of prebiotic fiber.
the subject strictly defines a prebiotic as an ingredient that 1) resists gastric acidity, hydrolysis by mammalian enzymes, and absorption in the upper gastrointestinal tract; 2) undergoes fermentation by intestinal microflora; and 3) selectively stimulates the growth and/or activity of “intestinal bacteria potentially associated with health and well-being”—that is, probiotics. So while “you see a lot of misuse” of the term in the market, says Anke Sentko, vice president, regulatory affairs and nutrition communication, Beneo (Morris Plains, NJ), if a fiber doesn’t meet those standards, it’s simply not prebiotic.

**Mounting Science**

The prebiotics that steal the spotlight as health-and-wellness ingredients are generally oligosaccharides, short chains of simple sugars found naturally in everything from garlic and asparagus to bananas, wheat bran, Jerusalem artichokes, and chicory root. And though “there’s no specific food crop that represents the optimal source of prebiotics,” says Michael Bond, product marketing leader, DuPont Nutrition & Health (Reigate, UK), “in terms of commercial extraction from these sources, only chicory and Jerusalem artichoke are used to any large extent as a source of purified prebiotics due to their relatively high oligosaccharide content.”

Sentko points to “more than 2,000 scientific publications” that in the past five years have investigated prebiotics, their interactions with probiotics, and their communication with other parts of the body. “A number of these studies look into the gut-brain axis,” she adds, “which involves the influence of bacterial breakdown products and metabolites and their outreach to other organs and regulation mechanisms like hunger and satiety.”

Staack notes that research also points to the merits of xylooligosaccharides (XOS) as a class of “emerging GRAS, FDA-approved prebiotics with a decade of science and multiple clinical trials” demonstrating their selective feeding of good bifidobacteria as well as their ability to do so “at a lower dose rate than other prebiotics”—perhaps as low as 1 g/day.

And while researchers are excited about XOS, perhaps the “most well-known and well-researched prebiotic on the market” is good-old chicory root fiber, or inulin, says Scott Turowski, technical sales manager, Sensus America Inc. (Raleigh, NC). That ingredient has built up a solid track record of promoting bifidobacterial proliferation and has also been the subject of reams of compelling inquiries into its benefits vis-à-vis weight management and immunity. “We hope to understand more about its effects,” Turowski adds, “and how they can be translated into claims that consumers can understand.”

**Closing the Information Gap**

Which brings us back to those fickle consumers and the gap that persists between their grasp of prebiotics and the potential the ingredients have for improving their health. Alas, observes Bond, “As with probiotics, where only the most informed and committed consumers actively seek out products with specific strains, awareness of specific prebiotic ingredients remains relatively low in the broader market.”

That may be because some “crossover” of prebiotics with fiber creates “confusion in the consumer’s mind,” he posits. But despite the fact that consumer awareness of prebiotics “continues to lag behind that of the more established probiotics,” he contends, “the market for prebiotics and finished products with prebiotic claims continues to increase.”

**Special Delivery**

Staack agrees, and he cites figures from Frost & Sullivan’s February 2015 “U.S. Prebiotic Market Overview” as calculating the domestic prebiotic ingredient market at $227.8 million in that year alone, with estimates of it reaching $4.5 billion by 2020, representing a CAGR of 12.1%.

“The expected growth is driven by increasing consumer demand for prebiotic ingredients in supplements and foods and beverages,” he notes. “Consumers who have begun to understand the benefits prebiotics bring are now looking to incorporate prebiotics into their diets. Fortunately for them and the makers of functional foods and beverages, that’s increasingly easy to do.”

As Staack explains, “Prebiotics have superior thermal and pH stability, as well as a long shelf life at room temperature.” While neutral, shelf-stable solid products remain the best product environments in which “to meet stability issues,” he says, “overall, prebiotics are easier to formulate with than probiotics and can be formulated into multiple applications.”

One day, consumers will appreciate that prebiotics act “as a ‘fertilizer’...to prepare the gut to use probiotics more effectively,” says AIDP’s Mark Thurston.
Indeed, says Turowski, “There aren’t many limits to the types of foods where they can be used.” Novel ingredient formats make bars, beverages, dairy, baked goods, snacks, sauces—just about all the stuff consumers like—fair game. “For that reason,” he says, “understanding the types of products where consumers would expect to find prebiotics may be the more relevant question to ask when determining the best applications to develop.”

As far as prebiotic ingredients themselves go, Bond notes that polydextrose is one of the most versatile available. He credits its excellent solubility and process and storage stability for its “universal application and ease of use” in both liquid and solid applications, “including those that undergo thermal processing and exhibit extremes of pH,” he says. “It’s also a very well-tolerated prebiotic with minimal impact on the taste or texture of the finished product.”

And Sentko says that thanks to their solubility and “mild, sweet taste,” inulin and oligofructose are trouble-free ingredients that “maintain or even improve product taste and, as a humectant, help a product maintain moisture and texture over time.” By functionally replacing a portion of a formulation’s sugar or fat, they can also take a bite out of a product’s calorie count, to boot.

And perhaps most advantageous of all—at least for some consumers—is the fact that prebiotics, by and large, are “clean” ingredients, frequently extracted from non-GMO plant-based sources using chemical-free, hot-water methods. As Sentko says, “Consumers like the idea that prebiotics naturally help the body support its own natural process.”

But will consumers like prebiotics even more if the fibers irrevocably hitch their stars to the probiotic bacteria that helped put them on the radar in the first place? Though experts agree that prebiotics and probiotics will probably remain linked in consumers’ minds for some time, “the future success of prebiotics is not inextricably tied to the continued success of probiotics,” Bond insists. Rather, he believes, prebiotics’ star will continue to rise along with interest in digestive and immune health, as well as with “the ability of prebiotic producers to generate the requisite levels of scientific evidence to support meaningful claims in an increasingly challenging regulatory environment.”

Kimberly J. Decker writes for the food and nutrition industries from her base in the San Francisco area, where she enjoys eating food as much as she does writing about it.

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Vitamin K Deficiency Linked to Increased Risk of Cardiovascular Disease?


Researchers have published further evidence supporting a connection between vitamin K deficiency and heart health, with a new study suggesting lower activity of vitamin K-dependent proteins (VKDPs) is associated with an increased risk of incident cardiovascular disease.

Writing in Arteriosclerosis, Thrombosis, and Vascular Biology, researchers evaluated the VKDP activity in a random sample of 709 multiethnic middle-aged and older adults free from cardiovascular disease. Subjects were then followed up with for 11 years to document ischemic cardiovascular-disease events, such as coronary heart disease, stroke, and fatal cardiovascular disease. Researchers determined VKDP activity by assessing circulating des-y-carboxy prothrombin (DCP) concentrations, with higher DCP concentrations reflecting lower VKDP activity—an inverse relationship.

The follow-up results suggested that incidence rates of ischemic cardiovascular disease were higher with greater concentration of DCP, reflecting lower activity of VKDP. What’s more, subjects with the lowest VKDP activity were found to have an approximately two-times higher risk of cardiovascular-disease events than subjects with the highest VKDP activity.

NattoPharma (Oslo, Norway), supplier of MenaQ7 vitamin K2 as MK-7, said the study “draws a clear line between vitamin K deficiency and an increased risk of coronary heart disease.”

“This is yet another important study showing that a lack of K vitamins, particularly vitamin K2, results in increased cardiovascular risk,” said Hogne Vik, PhD, chief medical officer of NattoPharma. “This finding should raise awareness of this important class of proteins as a potential contributor to cardiovascular disease protection.”

Vik also noted that the majority of study participants were found to be vitamin K sub-deficient, which is defined as DCP concentrations greater than 2 ng/ml. But for most people, certain vitamin K types may be in shorter supply than others, he explained.

“Western populations are not afflicted with blood diseases because of a vitamin K1 deficiency. Clearly, we get enough vitamin K in our diets to effectively coagulate blood,” Vik said. “However, our total K status outside the liver—particularly vitamin K2 status—plays an important role in maintaining and supporting our heart and bone health.”

As of the study’s publication, 19 VKDPs have been identified, NattoPharma notes, with the proteins thought to play important roles in platelet function, coagulation, and vascular biology.

Algae-Based Calcium May Enhance Bone Mineral Density


A new longitudinal study published in the Journal of the American College of Nutrition suggests that AlgaeCal, a vitamin-enhanced, algae-based calcium supplement, improves bone mineral density (BMD) in women. Researchers found that usage of the calcium supplement was associated with a 1.04% linear increase in BMD per year, amounting to a 7.3% total increase over the seven-year study period.

The study included female consumers who had purchased AlgaeCal (AC) for between one and seven years, in addition to completing at least one dual-energy x-ray absorptiometry (DEXA) BMD scan (n=172) and/or blood chemistry test (n=30). These consumers were contacted and offered complimentary repeat tests, which were then used to assess a 45-measurement blood chemistry panel and changes in BMD. Subjects in the AC group had a mean age of 65.1 +/- 7.8 standard deviation. Researchers found no adverse effects or safety concerns in the AC group.

Regarding BMD specifically, subjects taking AC from one to seven years showed a consistent and statistically significant increase in BMD within-group and compared to a 25,885-person control database. AC supplementation was associated with “a significant annualized and linear increase in BMD of 1.04% per year.” By contrast, among the control databases, there was a normative or expected decrease in BMD of 0.4% per year.

Based on the results, researchers concluded that there was no evidence of cardiovascular risk as a result of AC supplementation, or diminished AC efficacy, from year to year.

“The results are also consistent with earlier short-term studies suggesting that this supplement can facilitate significant increases in total body BMD, in contrast to studies suggesting that calcium supplements can only slow down age-related declines in BMD,” wrote researchers.

AlgaeCal is sourced from marine algae (trademarked Algas calcareas) and includes strontium, calcium, magnesium, vitamin D3, vitamin K as MK-7, vitamin C, boron, and other trace minerals.
Flint Families Need Our Help

You’ve likely seen the news coverage – Flint’s change of water source in 2014 to the Flint River corroded plumbing, allowing lead to leach into tap water. With an estimated $1.5 billion price tag and 30-year time frame for pipe replacement, there simply is no quick or easy fix. But for affected adults and children, life goes on.

*Nutritional Outlook* wants to team up with the nutraceutical industry to come together in support of the Flint community. Can you help? Your generous tax-deductible donation to the **Flint Child Health & Development Fund, established by the Community Foundation of Greater Flint**, is an investment in the chance for Flint’s children to enjoy healthier lives. *Nutritional Outlook*’s parent company, UBM, and their nonprofit arm will match the funds that we raise together, according to the scale of our response.

For more information, to donate, and to learn about other ways to help the Flint community, visit www.nutritionaloutlook.com/helpflint.

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It’s a familiar predicament when developing clean-label foods; many consumers say they’re opposed to artificial ingredients, but what exactly qualifies as a “clean” ingredient? That calculation can be especially challenging when it comes to preservatives. Is a “no preservatives” claim necessary to make a clean-label product, or will a “no artificial preservatives” claim suffice?

And if that wasn’t enough to mull over, the issue is further complicated by the lack of a formal regulatory distinction between “artificial” and “natural” preservatives, explains Hugh Welsh, president and general counsel, DSM North America (Parsippany, NJ). That leaves it up to food formulators to decide which synthetic preservatives are most troubling to their customers.

“While there is no [regulatory] distinction between a natural and artificial preservative, some ingredients, like BHA and BHT, have greater consumer recognition as ingredients to avoid on a product label,” says Welsh. He adds that benzoate and sorbate are two other chemical preservatives DSM is working to replace.

DSM’s DelvoCid natamycin—considered a natural preservative by many food companies—was recently granted Generally Recognized as Safe (GRAS) status for use in yogurts and beverages. These applications have proven challenging for DSM’s natural preservatives in the past due to the sedimentation of powdered-preservative solutions, but the new liquid formulation of DelvoCid dissolves quickly without sedimentation, explains Welsh, making it an ideal replacement for sorbate in yogurt.

Another synthetic preservative many formulators are working to replace is TBHQ, which is commonly used to extend the shelf-life of a wide range of foods, including meat products. One attractive alternative to TBHQ may be an oil-soluble green tea extract from Kemin Food Technologies (Des Moines, IA), which offers greater heat stability than TBHQ and can be combined with other plant extracts, such as rosemary, or tocopherols.

Then again, there are also those who are working to remove preservatives altogether from certain products. For instance, Corbion Caravan (Lenexa, KS) announced in March that it would begin offering preservative-free pre-soaked ancient grains. Many ancient grains are often sprayed with a mix of potassium sorbate and propylene glycol to defend against harmful microbes and increase shelf life, but Corbion was able to eliminate the need for these preservatives entirely by implementing new processing techniques.

But that doesn’t mean a “no preservatives” claim is the only route to a clean-label product. “One health-conscious consumer might place a great value on a ‘no preservatives’ label, while another would be just as satisfied with a ‘no artificial preservatives’ label,” says Ricardo Moreira, product manager of bakery for Corbion. “It’s important to know your specific market and consumer.”

Balancing Cost

There’s also the potential added cost to keep in mind when removing synthetic preservatives. DSM’s Welsh notes that natural preservative ingredients can be costlier to source, with a material supply that’s less reliable than their synthetically derived counterparts.

John Wyatt, product manager of North America food protection for DuPont Nutrition & Health (New Century, KS), agrees that natural preservatives can be more expensive than synthetics like BHT and BHA. But for many consumers, it’s worth it.

“The more label-friendly antioxidants, such as mixed tocopherols and natural flavor extracts, are more expensive, but they can also provide acceptable flavor and protection for the consumer that is demanding this type of product,” says Wyatt.

Earlier this year, DuPont rolled out its new BioVia CL 600 antimicrobial preservative for use in meat products. A combination of cultured dextrose and dried vinegar, BioVia CL 600 is effective at inhibiting growth of harmful microorganisms on both cured and uncured meat, according to DuPont.

There may still be some guesswork involved when it comes to matching consumer priorities for preservatives, but thanks to these new options with “natural” appeal, ditching synthetics has never been easier.
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