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Amazon Elements Supplements: Fear, or Follow?

When online-giant Amazon launched its Amazon Elements dietary supplements line with little fanfare this spring, it took those in the supplements industry by surprise, and it got a lot of attention, as is the case with anything Amazon. At present, the Amazon Elements line includes four organic supplements: Turmeric Root Extract, Calcium Complex, Vitamin D₂, and Vitamin K₂.

Aside from its Amazon name, the Amazon Elements supplements line is notable for the level of transparency Amazon is investing in this product line. One look at the website, and it’s apparent that Amazon is providing a lot of information about these products. Take the vitamin K₂. The retailer’s site describes everything from how the ingredient’s fermentation from chickpeas takes place to explaining why each ingredient was selected and added to the final formula. In a Q&A for the turmeric supplement, the retailer poses and answers questions like, “Is this supplement synthetic or made from an actual plant?” and “How long are supplements potent?”

But what’s probably getting the most attention is the QR code on each Amazon Elements supplement bottle that consumers can scan (using the Amazon mobile app, of course) in order to get more information about a product’s batch number, certificate of analysis, where the ingredients were sourced, when the supplement was made, how it was tested—basically “every bit of vital information,” Amazon says.

And while many consumers will likely think that Amazon is the first supplements brand to institute this type of traceability program, that isn’t the case. As far back as 2010, herbal-supplements brand Gaia Herbs introduced its Meet Your Herbs traceability program. The company redesigned all of its packaging to feature a unique identification number (an “Herb ID”) that consumers can enter on the www.meetyourherbs.com website in order to gain information about where an herb was grown, how and by whom it was certified organic, when the herb was harvested, and how it was extracted and tested.

But even if Amazon wasn’t the first to do this, its size and mainstream reach means that Amazon may be able to do what no one has done yet: popularize the notion of hands-on supplements traceability. As consumers become familiar with the Amazon Elements line, they will come to see this type of dietary supplement traceability as the norm, just as it has now become the norm to buy diapers, car tires, groceries, and everything in between through Amazon.com.

More importantly, other supplement companies that need to compete with Amazon may increasingly feel pressured to offer similar traceability. Think of how Amazon is selling this on its Amazon Elements website: “Openness on this level is unprecedented, but we see transparency as our responsibility to you.” What brand can deny this to their customers these days?

For those who sell supplements, the Amazon Elements line is both scary competition, but also begs the question of, “Should we follow?” And the answer is probably, yes.

At March’s Natural Products Expo West trade show, I spoke to Jeff Hilton, chief marketing officer and co-founder of longtime health and wellness branding and strategy firm BrandHive. Hilton said that when he learned of the Amazon Elements line and its traceability element, “my first response was, ‘Wow, Amazon.’ The industry is going to let them lead the way on this, of all people? I mean, we should own this mind space as an industry.”

Hilton’s feelings echo those of many at the Expo West trade show when he says, “I think Amazon threw down the gauntlet. We need to get on board with this because if Amazon’s doing it, you know they see opportunity or they wouldn’t be doing it.”

Traceability isn’t a goal to aspire to; it’s a reality of doing business in 2017. And the industry can either follow the leader or be left behind. Something tells me we’re going to start seeing a lot more of these traceability initiatives over the next few years, to the benefit of those who buy supplements and possibly also to the benefit of those who sell supplements, too.

Jennifer Grebow
Editor-in-Chief
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CRN “Optimistic” about Scott Gottlieb as FDA Commissioner Nominee

Following President Donald Trump’s nomination of Scott Gottlieb, MD, for FDA Commissioner on March 10, Steve Mister, president and CEO of dietary supplements association the Council for Responsible Nutrition (CRN; Washington, DC), told Nutritional Outlook that his organization is “optimistic” that Gottlieb will walk a “middle ground” on regulating the supplements industry.

Gottlieb served as FDA Deputy Commissioner in 2005–2007 during the George W. Bush administration. Prior to that, he served as senior advisor to FDA Commissioner Mark McClellan, MD, and as the FDA Director of Medical Policy Development. He is a practicing physician and a Resident Fellow at the American Enterprise Institute, a nonprofit, nonpartisan think tank for issues including economics, education, and health care.

“If confirmed by the Senate, Gottlieb would be in charge of implementing Trump’s plan to dramatically cut regulations governing food, drugs, cosmetics, dietary supplements, and tobacco,” Reuters reporter Toni Clarke wrote in a March 10 article titled, “Trump Chooses Gottlieb to Run FDA; Pharma Breathes Sigh of Relief.”

Not much is known yet about Gottlieb’s past stance, if any, on dietary supplements and whether he thinks the industry needs more, or less, regulatory oversight. According to Mister, CRN’s hope is that Gottlieb’s impression from his time at FDA is that the supplements industry is interested in cooperating with the agency and abiding by regulations. Mister pointed out that Gottlieb was working for FDA during the time when both the supplement industry’s adverse-event reporting law (the Dietary Supplement and Nonprescription Drug Consumer Protection Act) was signed into law (in 2006) and when the industry’s Good Manufacturing Practices regulation went into effect (in 2007). “I think he understands that the industry has tried to cooperate with the agency based on those kinds of experiences when he was there,” Mister told Nutritional Outlook at March’s Natural Products Expo West trade show in Anaheim, CA.

“We certainly know about his sort of general, conservative philosophy,” Mister added. “He wants government to get out of the way and let businesses do business when there’s not a public health need to be involved, but I think from his time at the agency, he understands that the agency is a public health organization and they have a job to protect safety. I think we will see him balancing those two.”

As such, Mister said, “we’re optimistic that Dr. Gottlieb will see both sides of it, and he will walk that middle ground.”

Of note, the Reuters article noted Gottlieb’s “deep ties to the pharmaceutical industry,” with Reuters source Michael Carome, director of Public Citizen’s Health Research Group, stating that Gottlieb “has spent most of his career dedicated to promoting the financial interests of the pharmaceutical industry.”

Mister said that as Gottlieb’s nomination heads to the Senate, CRN will be “reaching out to our friends in the Senate” to ensure that industry representatives have an opportunity during Senate hearings to present some of the questions at the top of industry’s mind now. “We’ll want to ask questions like, ‘Do you believe that DSHEA [the Dietary Supplement Health & Education Act] is sufficient regulation for this industry?’” Mister said. “That’s a good way to get them on the record saying, ‘Yes, I believe if this law is fully enforced that this adequately regulates the industry and protects consumer safety.’”

A “Post-Regulatory” Era

Gottlieb’s nomination also brought up the subject of a “post-regulatory era,” a term discussed by speakers during a panel at the Natural Products Expo West trade show on March 11 called “Supplements Today: Why the Future Looks Bright.” Namely, the speakers said, industry should be cautious about promoting the notion of loosening supplement regulations under a Trump administration.

One of the speakers on the panel, Senator Martin Heinrich (D-NM), said, “I know there’s a lot of people talking about the post-regulatory era in Washington, DC. I would really caution anyone from buying into that mindset, because if that is the case within the FDA and the federal government, you will see someone fill that vacuum—and often times, the risk that you have there is someone filling that vacuum based on the individual bad actor that should be dealt with and applying a broad-brush application of that to the entire industry instead of it being a more targeted sort of approach.”

Mister, who also spoke at the panel, told Nutritional Outlook, “I don’t think this is a post-regulatory era. Because what may happen is who is the regulator will just shift. If the states believe that FDA has been rendered ineffective or they believe that FDA is not being aggressive, the state attorneys general, for one, but even the state legislatures, will be more than happy to fill that vacuum, and so they will step in.”

“Let’s use this time. If this indeed turns out to be a time when we have a little bit lighter touch on regulation, let’s as an industry use this to be proactive on some of the voluntary things you can do and show that we’re out there ahead of it,” Mister said.
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EU Novel Food System: Now Faster—and Better

How the European Union’s new novel food regulation aims to quicken time to market and boost innovation.

BY THOMAS PAUQUAI, PHD, NUTRAVERIS

After 20 years, the European Union’s novel food regulation is finally getting an update. On December 11, 2015, the European Parliament published regulation (European Commission, or EC) No. 2015/2283 in the Official Journal of the European Union. The regulation, which becomes effective January 1, 2018, replaces the Parliament’s previously existing novel food regulation, (EC) No. 258/97, which was signed into law in January 1997.

The aim of the new regulation is to create a simpler, clearer, and more efficient authorization procedure for novel food ingredients, fully centralized at the EU level. By streamlining the process, the regulation should enable safe and innovative novel foods to enter the EU market faster, without compromising a high level of public health.

Novel Food Revision and Definitions

The general definition of a novel food remains unchanged in this new law—namely, a novel food is considered an ingredient not used for human consumption to a significant degree within the European Union before May 15, 1997, the date the original novel food regulation, (EC) No. 258/97, went into force.

The scope of this regulation should, in principle, remain the same as the scope of regulation (EC) No. 258/97. However, given the scientific and technological advancements that have occurred since 1997, the regulation does review, clarify, and update the categories of food which constitute novel foods. As of now, those categories include:

- Whole insects and their parts
- Food with a new or intentionally modified molecular structure, as well as food from cell culture or tissue culture derived from animals, plants, microorganisms, fungi, or algae
- Food from microorganisms, fungi, or algae
- Food from material of mineral origin
- Food from plants obtained by non-traditional propagating practices where those practices give rise to significant changes in the composition or structure of the food, affecting its nutritional value, metabolism, or level of undesirable substances.

Novel foods also include food from plants obtained by non-traditional propagating practices where those practices give rise to significant changes in the composition or structure of the food, affecting its nutritional value, metabolism, or level of undesirable substances. The definition of novel food may also cover food consisting of certain micelles or liposomes.

As for emerging technologies in food production, the regulation further specifies that a food should be considered a novel food when it results from a production process not used for food production within the European Union before May 15, 1997, if that process results in significant changes in the composition or structure of a food, affecting its nutritional value, metabolism, or level of undesirable substances. Foods consisting of engineered nanomaterials are also considered novel foods under this regulation.

Examples of novel foods include agriculture products from non-EU countries (e.g., chia seeds), newly produced nutrients (e.g., synthetic zeaxanthin), or extracts from existing food (rapeseed protein). The novel food regulation still excludes genetically modified food (regulation (EC)...
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No. 1829/2003), food enzymes (regulation (EC) No. 1332/2008), food used solely as additives (regulation (EC) No. 1333/2008), food flavorings (regulation (EC) No. 1334/2008), and extraction solvents (directive 2009/32/EC).

Novel foods should not be placed on the market or used in food for human consumption unless they are included in a European Union list of novel foods authorized to be placed on the market within the Union. It makes sense if this European Union list included novel foods already authorized or notified in accordance with regulation (EC) No. 258/97, including any existing authorization conditions.

The procedure for submitting a novel food application remains the same. A novel food application must prove the safety of the novel food/ingredient and will be submitted to authorities for evaluation. The goal of the application is to characterize the ingredient and prove its safety through toxicological data. In a recent guidance, the European Food Safety Authority (EFSA) specified that minimum requirements which should be covered in all applications relate to the description of the novel food, production process, compositional data, specification, proposed uses and use levels, and anticipated intake of the novel food. Further information includes the history of use of the novel food and/or its source, absorption, distribution, metabolism, excretion, nutritional information, toxicological information, and allergenicity.

Of note, EFSA now expects data on toxicokinetics (absorption, distribution, metabolism, and excretion—ADME) that are important in the assessment of both the nutritional and toxicological impact of a novel food. One potential problem is that toxicokinetic/ADME studies are often adapted to drug molecules, but not to natural ingredients like botanicals. It also raises the question of how regulators will assess ADME for complex ingredients (such as a mix of plants). It’s also unclear how a firm might perform an ADME study for an ingredient like a probiotic.

Phasing Out Substantial Equivalence
It’s important to note that the new regulation will phase out a component of the original novel food regulation that had provided a simplified procedure for manufacturers to introduce novel food ingredients to market in the EU. Known as the “substantial equivalence” procedure, the rule said that if a company’s ingredient was deemed by a scientific committee to be similar to another ingredient already authorized as a novel food, that company could file a notification with the European Commission notifying the commission that it intends to market the ingredient. “[F]oods or food ingredients which, on the basis of the scientific evidence available and generally recognized or on the basis of an opinion delivered by one of the competent bodies, are substantially equivalent to existing foods or food ingredients as regards their composition, nutritional value, metabolism, intended use, and the level of undesirable substances contained therein” were able to take advantage of this substantial equivalence rule.

This simple, cheap, and quick procedure will disappear on January 1, 2018, when the new regulation kicks in. It can seem pretty useless to require firms to apply for a “substantial equivalence” concerning, say, chia seed oil when more than 50 notifications have already been accepted for similar ingredients.

Traditional Foods from Non-EU Countries
At the same time that the new regulation phases out the very useful substantial equivalence rule, the new regulation also introduces a notification procedure that streamlines the process for traditional foods from non-EU countries.

The new rule says that if a food has been safely consumed in at least one non-EU country for at least 25 years as a part of the customary diet of a significant number of people, a company should provide information on the description, production process, compositional data, specifications, experience of use, and proposed conditions of use of the traditional food for
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the EU market. In a recent guidance, EFSA specified that references could include scientific publications, scientific expert opinions, monographs, information from international or national organizations, governmental documentation, and figures on cultivation/harvesting, sales, and trade. Further information might be obtained from cookbooks, recipes, and anecdotal data. One might also ask the question of how EFSA will weight the importance of such data to conclude whether a food is safe or not. Only time will tell.

More Efficiency, More Innovation

These new novel food authorization procedures are intended to be simpler, quicker, and centralized at European Commission level. Above all, it aims to shorten the waiting time companies currently endure before ingredients are approved—to reduce the current length (three-and-a-half years on average) under the current regulation, the EC says.1

According to the EC, "The new Regulation increases the efficiency of the authorization procedure, enables a quicker delivery of safe, innovative food to market, and removes unnecessary barriers to trade, whilst ensuring a high level of food safety."

If and when the European Commission requests an opinion from EFSA, it shall forward the valid application to EFSA without delay, and not later than one month after having verified its validity. EFSA shall adopt its opinion within nine months from the date of receipt of a valid application. In assessing the safety of novel foods, EFSA shall, where appropriate, consider whether: 1) the novel food concerned is as safe as food from a comparable food category already placed on the market within the European Union; 2) the composition of the novel food and the conditions of its use do not pose a safety risk to human health in the Union; 3) a novel food, which is intended to replace another food, does not differ from that food in such a way that its normal consumption would be nutritionally disadvantageous for the consumer.

According to the European Commission, "The new novel food regulation...aims to improve conditions so that businesses can more easily bring new and innovative food to the EU market, while still maintaining a high level of food safety for European consumers. It will offer European consumers the benefit of a broader choice of food and a more favorable environment for Europe's agri-food industry—the second largest employment sector in Europe—to benefit from innovation, which in turn is good for growth and jobs."

**Reference**


**Thomas Pauquai** has a PhD in physiology and physiopathology. As head of the health claims and food safety department at regulatory consultant Nutraveris (Ploufragan, France), he and his team prepare and submit successful health claim and novel food dossiers, formulate innovative health products, submit patents, and write scientific argumentation records justifying the efficacy and safety health nutrition products.
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How Will Donald Trump Affect Global Ingredient Sourcing?

While there are many unknowns, the consensus seems to be that if there is any one area where the president’s policies could directly impact the industry, it is the global sourcing of ingredients.

By Jennifer Grebow, Editor-in-Chief

It goes without saying that there are many uncertainties regarding how President Donald Trump’s policies, present and future, will impact the dietary supplement and natural products industries specifically. While there are many unknowns, the consensus seems to be that if there is any one area where the president’s policies could directly impact the industry, it is the global sourcing of ingredients, given the president’s calls for domestic business over offshore production.

With this in mind, we asked key industry leaders the following question: “For better or for worse, how do you think Donald Trump’s presidency will affect global sourcing of dietary supplement ingredients?” This is what they said.

Marc Ullman, Of Counsel, Rivkin Radler LLP

“A month into the Trump Administration, it still seems impossible to tell what U.S. trade policies will look like a year from now. We continue to hear conflicting messages concerning tariffs and the U.S. position on free trade generally and, of significant concern to the supplement industry, specifically in connection with China and other Asian markets. A major concern for the industry has to be the potential imposition of border taxes, tariffs, or customs duties, which will raise prices to companies importing ingredients and, eventually, consumers—which may in turn negatively impact an otherwise healthy (no pun intended), growing market.”

Vincent Tricarico, Vice President of Contract Manufacturing, NutraScience Labs

“Companies in the nutritional products industry will need to keep a close eye on the administration’s plans for imposing tariffs on imports. This is especially important for the sourcing of dietary ingredients, as many suppliers are overseas currently. It will be especially critical to see how the relationship with China plays out. Regardless, what this brings is an opportunity for companies who are investing in resources located in the United States and will bring more value to the ‘Made in the USA’ brand. What we can be sure of is the importance of self-governance within the industry, as the new administration has promised to promote business by reducing unnecessary regulations. As an industry that must maintain trust with consumers, self-regulation to keep low-quality products made in sub-sufficient facilities will be imperative.”

Jeff Crowther, Executive Director, U.S.–China Health Products Association

“If President Trump decides to levy tariffs on Chinese ingredients, consumers will pay in the end. We would all like to see a more balanced trade policy on both sides of the Pacific, but currently there is not much of a balance. When Chinese ingredient companies export to America, there’s typically very little, if any, taxes imposed on their products. However, when U.S. companies use these ingredients to produce finished dietary supplements and then export to China, there are a variety of taxes, such as a 20% import tax and a 17% Value Added Tax.”
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Furthermore, prior to export, international companies must get supplements approved by China’s Food and Drug Administration, which costs approximately $150,000 per product and takes two to three years to complete. Does the above importing procedure comparison seem balanced? Of course not. As we can only speculate what President Trump will do, I can only suggest that the best solution would be to encourage China to lower their importing taxes and regulatory hurdles. This would be the best way to go, as it would have less impact on consumers and be fair to both Chinese and American industry players.

George Pontiakos, President and CEO, BI Nutraceuticals

“Agriculture is a significant industry for the United States. The production from the United States feeds a great portion of the world. While American pickers and wildcrafters anticipate a constrained Department of Interior, EPA, etc., we feel that the overall impact of the Trump administration’s policies will be positive. We anticipate a renewed focus on small business and USA-based manufacturing. Overall, agriculture stands to benefit from this shift.”

Saumil Maheshvari, Business Development, Orgenetics Inc.

“To put it briefly, it is still too early to tell. President Trump, during the election season, had at times advocated raising tariffs as a means of accomplishing some of his administration’s goals. If the tariff system indeed is changed in the direction of higher tariffs, we may see a slightly negative impact in terms of costs. As we source and import from India, on a more micro level, we would be affected negatively by an increase in tariffs that deal with imports from India (or deal with the general extracts category). If President Trump does not touch tariffs in this area, we could see unhindered growth, especially in the organic sector.

The direction FDA may head in...is not completely clear. If deregulation is the new administration’s goal, then we could see changing FDA guidelines that may make it easier for supplements. However, this is a double-edged sword as it could allow for lesser-quality supplements to be in the marketplace. If the FDA sticks to its set of supplement guidelines that are currently in effect (or scheduled to go in effect over the next year), then it could definitely help the industry.”

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Opportunities in the children’s health products market.

BY INNOVA MARKET INSIGHTS

Manufacturers and retailers can find great opportunities in products designed and targeted specifically to children, especially those that cater to parents seeking cleaner labels. Parents want to buy these products. Organic and additive-free options, non-GMO, "low" and "light" alternatives, and other "free from" options, led by gluten free, are especially high in demand.

Reduced Sugar

Concerns over sugar content continue to grow, with rising publicity about high sugar intake and its role in childhood obesity and other chronic health problems. Marketers continue to lower the sugar content in kids’ products or find substitutes altogether.

The soft drinks category is now leading activity for sugar reduction, with 18% of launches recorded by Innova Market Insights in the 12 months ending June 2016 marketed as "low sugar," "sugar free," or "no added sugar." In North America, this percentage was even higher, at over 22%. The highest level of sugar-reduction activity has been in juice/juice drinks and flavored bottled waters, which are both key products consumed by children (although relatively few products are targeted specifically at them).

According to Innova Market Insights data, "no additives/preservatives" continues to be the leading health claim used for U.S. soft drink launches targeted at children aged 5-12, although "no added sugar" was a strong second, used by 42% of soft drink introductions over the 2014–2016 period. An example of a child-oriented product is Surprise Drinks’ Hasbro My Little Pony Surprise & Play range of flavored spring waters. To satisfy the health concerns of parents, these drinks are 15% juice, contain no added sugar, are only 20 calories per bottle, and are additive/preservative free. For the child, the drink comes with a captivating set of licensed characters and an included toy.

Dairy

Concerns over sugar are also manifesting in more surprising areas, such as dairy.

The yogurt category in particular has come under fire for sugar content. As a result, the yogurt category has seen rising levels of sugar-reduction activity as it strives to clarify its nutritional benefits and emphasize its place as part of a healthy, balanced diet. Not surprisingly, there has been particular interest in such activity in the children’s yogurt market, where leading brands are striving to answer growing concerns.

Leading handheld children’s yogurt Yoplait Go Gurt tubes, for example, now states its sugar content (8 g) prominently on the package. The company has also addressed concerns about sweetener types, with prominent "no high-fructose corn syrup" claims. It also targets a cleaner label with the addition of its Simply brand product line.

Another yogurt brand, Chobani, markets its Chobani Kids pouches as containing “25% less sugar and twice the protein of the leading kids’ yogurt,” emphasizing that the products are also all natural, GMO-free, and low in fat.

Dietary Supplements

The United States has traditionally had a strong level of interest in dietary supplements and is the largest and most developed market in the world. U.S. supplement launches accounted for nearly one-third of global supplement launches in 2016.

U.S. consumers are the most likely to use dietary supplements to fill perceived gaps in their own diets and their family’s diets. As such, U.S. consumers account for an even higher share of the global children’s supplements market, accounting for 45% of the total. (This was equivalent to only a modest 1.2% of total U.S. dietary supplement launches over the same period, however.) Those purchasing children’s supplements have a particular focus on general health, immunity, closing potential dietary/nutritional gaps, and boosting cognitive development. Although children’s supplements are relatively established on the market, there has
been a focus in recent years on improving methods of delivery and making them more appealing to children.

Child-friendly graphics are also a hallmark of the market, as is the case with brands such as Yummi Bears, Lil Critters, Smarty Pants, and Vitamin Friends. These are increasingly being joined by character-licensed products to further encourage children’s interest. Activity in 2016 included products featuring well-known film and TV characters, such as chewable multivitamins featuring Max & Ruby characters, Mr. Men Little Miss Immune Support softies from Haliborange, and Barbie and Despicable Me/Minions multivitamin gummies from Lil Critters.

Gummies are increasingly popular in children’s supplements and are becoming more sophisticated, with appealing flavors and a range of shapes. Like other chewable options, they offer an easier-to-consume format than traditional tablets and capsules.

Powders for making shake-style drinks, and ready-to-drink liquids, are also doing well. These liquids may range from the relatively traditional, such as the elderberry syrups under the Nature’s Way Organic Sambucus for Kids brand, to the more modern, such as the Manuka Health Kids Syrup featuring Manuka honey.

Although multivitamins remain the most popular children’s supplement option, there are also products for children offering specific support in the areas of immune health, digestive health, and bone health, as well as specialized products such as The Ginger People Ginger Rescue for travel sickness, Source Naturals Wellness Earache supplements, and Prospinach’s Kidspinach Berry Apethyl, said to “reduce cravings for sweet and unhealthy foods.”

Appealing to Both
Health tends to be the key parental concern, including issues of clean labeling and nutrition. Children, on the other hand, look to features such as shapes, flavors, bright and appealing packaging, and the use of trendy licensed characters. Although parents and children may have different tastes, companies need to focus on attributes that broaden a product’s appeal to both groups.

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As director of London-based New Nutrition Business, Julian Mellentin has made a name for himself as a savvy analyst of the headlines sweeping the global health-and-wellness marketplace. And while that entails keeping an eye on the broad swath of functional-ingredient goings-on, sometimes a trend so crowds his viewfinder that he just can’t get it out of his sights.

Such may be the case with turmeric—which, by Mellentin’s reckoning, is well-nigh inescapable. “In Sydney and Melbourne,” he says, “you can order a turmeric latte in any city-center café, or buy a supermarket premix to take home.” In the States and Canada, he’s heard tales of dieticians instructing clients on the drink’s at-home preparation—should the turmeric bars and beverages for sale at local grocers not sate their cravings. And in London, Manchester, and Glasgow, he says, “You can now buy turmeric yogurt.” His conclusion: “Any company in the Western world that doesn’t have a product featuring turmeric in its new-product-development plans should think again. Turmeric is coming.”

In fact, it’s already here. When Innova Market Insights (Arnhem, The Netherlands) tallied recent food and beverage launches with a turmeric and/or curcumin health claim, it found the total grew by 79% globally from 2014 to 2015, with another 25% increase rolling in from 2015 to 2016, according to Lu Ann Williams, research manager at the firm.

Such numbers suggest descriptors like “meteoric,” “skyrocket,” and “phenomenon”—or, if you’re more cynically inclined, “bubble.” Which raises a reasonable question: With turmeric on such a tear, how long might its time in the sun last? And what, if anything, can brands do to keep the momentum going?
Whole-Package Potential
For a botanical whose history stretches back literally millennia, turmeric might seem an unlikely twenty-first-century sensation. Yet for three years running, it’s topped natural-channel ingredient sales, per the American Botanical Council (Austin, TX). As Stefan Gafner, PhD, the Council’s chief science officer, notes, mainstream awareness is finally catching up to what natural shoppers have long known.

“Interest in turmeric started a while ago,” he says, “but it often takes time for an ingredient to reach the critical mass of research data to attract attention.” And research data increasingly implicates turmeric in everything from weight management, cardiovascular support, and enhanced cognition to reduced gastrointestinal distress and joint pain.

But the latest studies focus less on turmeric itself than on a class of compounds called curcuminoids, which Shavon Jackson-Michel, ND, scientific and medical affairs, DolCas Biotech (Landing, NJ), labels turmeric’s “star constituents,” whose health-giving properties “are collectively important in any chronic-disease approach.”

The best known of these curcuminoids is curcumin, and though scientists once ascribed to it “the vast array” of turmeric’s benefits, says Shaheen Majeed, marketing director, Sabinsa (East Windsor, NJ), following isolation of turmeric’s other curcuminoid constituents—namely, demethoxycurcumin (DMC) and bisdemethoxycurcumin (BDMC)—“several studies have demonstrated wide clinical applications for all three” as a group.

Scratching the Surface
So how do curcuminoids in general and curcumin in particular work? As Cheryl Myers, head of scientific affairs and education for EuroPharma (Green Bay, WI), explains, “Curcumin fights two major causes of disease”: inflammation and oxidation. “That means it naturally stops tumor formation, neural degeneration, muscle and arthritis pain, and many other conditions,” she says. “While there’s still much research to be done, a casual glance at curcumin’s many abilities shows why it’s so popular.”

But curcumin and its siblings aren’t all turmeric has going for it. The root’s essential oils, known as turmerones, assist curcuminoids’ transport and absorption into cells and synergistically enhance their anti-inflammatory and antioxidant action. In so doing, DolCas’s Jackson-Michel says, they diversify turmeric’s “healing profile.”

The upshot is that turmeric’s full suite of benefits “is more fully realized in the presence of turmerones,” she concludes. “But still, we believe there’s yet more to uncover. With
more than 230 constituents known to exist in this rhizome, even these two highly active groups might just scratch the surface of the botanical’s therapeutic use.”

**Media Matters**

For now, at least, brands eager to ride the turmeric wave seem content to scratch the surface, building their formulations around the curcumin we know rather than the 230-something other compounds we’re still learning about. And they appear to have made the right choice, for “companies with branded curcumin products have definitely set in motion interest in turmeric’s profile and health properties,” says Nipen Lavingia, vice president of marketing at DolCas.

Further “elevating mainstream consciousness” about turmeric, he adds, is its “rich history” in India’s Ayurvedic tradition, as well as its current “cultural context” as a natural health ingredient. And perhaps most influential of all is the panoply of media that’s offered turmeric a platform in print, on screens, and online.

“I think media coverage has absolutely made a difference here,” says Myers, “much as it has with other natural ingredients, including St. John’s wort, açai, maca, and green tea.” Indeed, when *The Washington Post*’s 2017 “In/Out List” elected turmeric an “In” for the first time since the list’s inception in 1978, the invitation came at the expense of matcha green tea, which, alas, got boot ed “Out.”

Timing has also worked in turmeric’s favor, Lavingia adds, as “its popularity has paralleled the increased use of the Internet for engaging through social media and accessing online purchasing.” A deep dive by Google Trends, the arm of the search giant that tracks search frequency, revealed interest in turmeric rising 56% from November 2015 to January 2016, while turmeric videos on YouTube garnered some 3.9 million views.

**Natural Credibility, Strong Science**

“The online discussion about turmeric’s benefits—from inflammation-fighting to better-looking skin—is surging,” Mellentin says. And while some claims may seem too good to be true, Mellentin is adamant: “Don’t disparage the science. Turmeric is one of the most researched food ingredients. It has excellent ‘naturally functional’ credentials, which have already proven to be the most powerful driver of growth.”

Innova’s Williams agrees. “Going back into the past to rediscover ‘old’ ingredients with inherent health appeal has been a significant food trend in recent years,” she says. Whether turning to chia or kale, “Consumers are looking more for natural health benefits in the products they buy, and being a traditional, natural ingredient powerhouse lets turmeric tick a lot of those boxes.”

Including the science one, Jackson-Michel points to 9,000-plus PubMed studies on curcumin to date, which in and of themselves may vault the compound into the “top-five most studied natural constituents ever,” she says.

Among recent research results are those suggesting a complementarity between curcuminoids and omega-3 fatty acids in which the two help “bring relief to conditions where inflammation plays a major role,” Ma jeed says. One such study, *in vitro*, looked at

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A TRIP DOWN TURMERIC LANE

Products putting turmeric in the spotlight

Whether searching for a supplement or snack, shoppers have no shortage of turmeric- and curcumin-containing products to choose from these days. We asked experts which items have jumped off the shelves at them lately.

Shavon Jackson-Michel, ND, Scientific & Medical Affairs, DolCas Biotech (Landing, NJ): “DolCas Biotech—Arjuna Naturals is excited to see their BCM-95-branded turmeric extract in gummies conducive to children and others who prefer not to swallow pills or be held hostage to expensive bars and drinks. People in these categories could benefit from a clinically relevant dose of BCM-95 in this format and without adding too many sugars or calories to their regimens. This product is being prototyped with hopes for a launch as early as the second quarter.”

Cheryl Myers, Head of Scientific Affairs & Education, EuroPharma (Green Bay, WI): “What makes EuroPharma’s recently launched Terry Naturally Enhanced Whey Protein special is the addition of our Curamin clinically proven curcumin. Every scoop of the Curamin whey protein is like taking a full tablet of our Curamin Extra Strength product, which helps athletes bounce back from muscle damage faster because it facilitates healing by reducing some of the inflammatory processes that happen with muscle building. In addition, there’s nothing that I know of that’s better for post-exercise pain than Curamin Extra Strength...There really is a rationale of why we put those two popular ingredients together. We wanted to offer something that wasn’t just whey but that could help consumers with some of their other health concerns as well.”

Lu Ann Williams, Research Manager, Innova Market Insights (The Netherlands): “Turmeric is moving into a wide array of market categories. Tea and juice and juice drinks are popular product avenues for turmeric applications. We’re also seeing turmeric/curcumin as a star ingredient in snacks and even chocolate. New product examples recently launched include Daily Greens Green Ade Orange–Turmeric Juice with Chlorella in the U.S., Lifefood Crawnchies Pumpkin Curcuma Organic Bio Raw Chips in the UK, and Trader Joe’s Golden Spiced Milk Chocolate Bar, again in the U.S.”

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Julian Mellentin, Director, New Nutrition Business (London): “Waitrose is a 120-year-old, UK-wide supermarket chain with a reputation for high quality that’s owned jointly by its employees and a charitable trust—making it more attractive than Wal-Mart to shoppers with a strong moral compass. The retailer has debuted the UK’s first yogurt to feature turmeric; it may even be the first in Europe. The company is good at sensing trends, so its newest yogurt lineup under its own brand has a vegetable theme, including a pineapple, butternut squash, and turmeric flavor. Is there enough turmeric in one 125-g pot to make a difference to your health? Probably not. But that’s not the point. Turmeric is trendy, adds vibrant color to the finished product, and is a nice health halo for the ever-growing number of people who want to get more of it into their diets.”

By pairing whey protein and curcumin, EuroPharma not only leverages two very popular ingredients but also promotes muscle building and healing.

Supermarket chain Waitrose debuted the UK’s first yogurt featuring turmeric.

Lifefood’s Crawnchies veggie chip blends the taste of pumpkin and turmeric in a flaxseed base.

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Botanicals

the ability of curcuminoids and eicosapentaenoic acid (EPA) to halt protein degradation caused by the inflammatory cytokine tumor necrosis factor alpha (TNF-α) and proteolysis-inducing factor (PIF), a compound associated with cancer-related muscle breakdown. Majeed points to two other animal studies demonstrating curcumin and EPA’s dual effectiveness in preventing muscle wasting; preventing and reversing weight loss; and improving quality of life in an experimental cancer model.

One study Gafner deems notable investigates how a curcumin-enriched diet might beneficially modulate colonic flora in mice. “Further research in this area may lead to a number of interesting findings,” he says. Already, Jackson-Michel notes, “Altered gut microbiology can persistently contribute to systemic inflammation and, thus, become an underlying factor in the development of chronic disease; recent evidence has connected gut health to other internal workings, including immune and mental health, and curcumin is known for its potent immune system activity and mental health benefits.”

Myers adds that the curcumin extract and curcumin essential oil in her company’s products appear in clinical research to reduce depression and anxiety symptoms in those with major depressive disorder. And she says that studies show it to be “an excellent adjunct therapy with conventional treatment for prostate cancer,” boosting the effect of radiotherapy by preserving and even increasing total antioxidant capacity.

Down to Specifics

Such results buoy Myers. “The science shows no sign of slowing down,” she says, adding that she receives links to anywhere from 20 to 30 new curcumin studies per week. “As long as we keep finding more positive data and proven clinical applications,” she says, “curcumin will continue to grow.”

But if there’s a cloud behind those silver linings, she and others suspect it’s the lingering confusion among consumers in distinguishing turmeric from the curcuminoids primarily responsible for its health benefits. Most major health research involves curcumin—not turmeric, which she says is only 2%–5% curcumin. “So someone taking a single capsule of turmeric per day will likely be quite disappointed if they’re seeing the health benefits attributed to curcumin,” she says. And to those hoping to get therapeutic levels through diet alone, she says this: “If you’ve been eating a standard Western diet for most of your life, trying to achieve medicinal levels of curcumin by eating more curry is just not going to cut it.”

Her concerns underscore the duty of turmeric brands—or brands marketing any functional ingredient, for that matter—to stay on top of both the medium and the message. As Gafner says, “It may not matter to the consumer whether it’s curcumin or another turmeric component that provides the benefit. But for a responsible manufacturer, it’s very important to understand which components in an ingredient are responsible for a health benefit to ensure that this benefit can be provided on a continuing basis.” Majeed adds that formulations—“to preserve and protect the integrity of curcumin”—deserve none other than high-quality natural turmeric inputs, and in quantities that jive with what research shows is beneficial. “Maintaining product integrity is key to creating and keeping customer loyalty,” he says.

So, too, is continuing science. Sustained interest in turmeric, curcuminoids, or both will be a direct consequence of “how avidly the private and academic sectors pursue further study into the rhizome,” Lavingia concludes. And though the market is already crowded, “brands that succeed will be inquisitive and innovative,” plumbing new findings “better to understand and apply turmeric’s rich medicinal history to today’s medicinal woes,” he says. If they play those cards right, “the consensus seems to give this golden spice at least another five strong years.”

References


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.

Israeli dietary supplements brand Anlit Ltd plans to introduce a new curcumin vegetarian gummy supplement at the upcoming Vitafoods Europe trade show in Geneva in May. Importantly, the gummy is vegetarian, replacing gelatin with pectin because Anlit supplements are also certified kosher and halal.

The company says that overcoming the taste and aroma challenges associated with curcumin was an achievement. “There are only a few turmeric gummies in the marketplace, but Anlit’s unique technology allows for the incorporation of a substantial dose of curcumin—30 mg—in synergy with 150 mcg of piperine per gummy, without affecting taste or texture,” says Shai Karlinski, vice president of sales and marketing for Anlit.

With 150 mcg of piperine per gummy, the curcuminess of Anlit’s curcumin gummy serves and protects the integrity of curcumin—an achievement. “There are only a few turmeric gummies in the marketplace, but Anlit’s unique technology allows for the incorporation of a substantial dose of curcumin—30 mg—in synergy with 150 mcg of piperine per gummy, without affecting taste or texture,” says Shai Karlinski, vice president of sales and marketing for Anlit.
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Superfruits, Super Resilient
Superfruits are still going strong in the U.S.

BY MAUREEN KINGSLY

Fruits rich in phytonutrients, including antioxidants, and associated with extraordinary potential health benefits, such as antiaging or cancer-fighting qualities, have been marketed as “superfruits” (a spin-off of “superfoods”) since about 2005. Many superfruits are also rich in other ingredients associated with good health, such as fiber and the letter vitamins.

The “superfruit” label has been applied to such domestically produced, widely available fruits as blueberries, cranberries, and cherries, as well as to more seemingly “exotic” fruits with international origins and histories, such as acai, pomegranate, maqui, goji, and baobab.

More than a decade since the “superfruit” moniker was introduced to the public, this category of edible plants still demonstrates remarkable market resilience, evolution, and popularity. While some fruits pegged as “superfruits” might enjoy their proverbial 15 minutes of fame before fading into relative obscurity. *Nutritional Outlook* observed in a story from 2015 that once a fruit is labeled “super,” it doesn’t seem to ever vanish completely from the market or from popular media’s memory.

This article examines the superfruits category more closely, paying particular attention to the handful of superfruits with the most staying power, the rapid growth of the superfruit-juice market, and newer superfruit additions to the U.S. market.

**Superstar Superfruits**

Pomegranate, blueberries, acai, and cranberries have remained popular and generally well regarded since earning their superfruit crowns several years ago. “There is still high demand for the original superfruits,” says Ramon Luna of ingredients supplier Ecuadorian Rainforest’s (Belleville, NJ) marketing department. “Marketers have done an excellent job communicating the benefits of these fruits with the public, offering honest and clear information on them and their possible health benefits,” he adds.

Lu Ann Williams of market researcher Innova Market Insights points to pomegranate in particular as being “the leading superfruit used in new product launches in the United States in 2016,” with its inclusion in 43% of superfruit-related product launches. And while the fruit’s total sales were actually down by 30% in all combined retail channels at the end of 2016 from one year prior, according to Paige Leyden, natural products researcher for market researcher SPINS, sales increased in the natural channel by 7%, and pomegranate “is growing in food-based supplements,” she explains. “Food-based supplements is also where we see the most brand presence for pomegranate.”

Supplier BI Nutraceuticals’ (Long Beach, CA) Alison Raban, certified food scientist, says her company sees steady demand for pomegranate “due to consumer familiarization” with the fruit. (That familiarization is likely due, in large part, to the robust health-focused marketing and research efforts of the company Pom Wonderful, founded in 2002 by owners of pomegranate orchards in California.)

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Acai is growing across all retail channels, according to SPINS.

Health in a Bottle? Superfruit Juice Sales Are Up…and Forecast for Further Growth

Data from Euromonitor shows superfruit-juice sales growing fast, with no end to that growth in sight for the next four years. (These juices are defined by Euromonitor as “naturally healthy beverages that combine fruit juice with exceptional nutrient richness, high antioxidant content, and potential health benefits, including acai, Aloe vera, blueberry, cranberry, coconut, goji, pomegranate, noni, mangosteen, and seabuckthorn.” They include frozen, not-from-concentrate, and reconstituted juice, as well as organic superfruit juice and mixes of superfruit juice with other fruit.)

According to data pulled by Euromonitor in mid-January 2017, total sales (retail value RSP) of all superfruit juice in the United States in 2016 were about $2.1 billion. This figure represents growth of about 9.5% over the previous year. Additionally, Euromonitor forecasts total domestic sales of all superfruit juice in 2021 to be $2.9 billion, with sales growing at an impressive compound annual growth rate of 5.7% between now and then.

Superfruits To Watch

While pomegranate, acai, blueberry, and cranberry dominate much of the superfruits market, additional fruits are claiming their share, too. Baobab, for instance, is showing notable growth, with “double-digit sales attributed to the natural channel” according to Leyden. Within that channel, sales of baobab in 2016 were up an eye-popping 81% over the prior year. Leyden says baobab is now found across supplement and food/beverage categories, including in cold cereals and, “more recently, as a functional ingredient in wellness bars.” Leyden also points to guanabana (also known as graviola), jackfruit, and dragonfruit as emerging superfruits that are attracting the attention of U.S. consumers.

Supplier BI Nutraceuticals adds noni and tamarind to that list, and Ecuadorian Rainforest points to increasing interest in amla berry, also known as Indian Gooseberry.

"There is still high demand for the original superfruits," says Ramon Luna.

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.
Judging by the massive turnout at Women’s Marches around the world this past January, women’s liberation is clearly back in style. (The movement even has its own signature headgear: those très chic pink caps.) And while it’s gratifying to stand back and marvel at all the oppressions the distaff sex has liberated itself from—the patriarchy, household drudgery, shoulder pads—to tweak a certain marketing slogan from feminism’s second wave, “You’ve got a long way to go, baby.”

Case in point: Women have yet to liberate themselves from urinary tract infections (UTIs), or from the endless courses of antibiotics needed to treat them. But they’re making progress, thanks to research into the cranberry, which has long been something of a folk remedy for when urinary health falters.

Notes Christina Khoo, PhD, director, global research sciences, Ocean Spray Cranberries (Lakeville-Middleboro, MA), “For generations, women have passed down their belief in cranberry’s ability to help prevent urinary tract infections based on their own positive experiences.” What’s different now, she says, is that “more than 50 years of well-documented research has turned this folklore into fact.”

What’s also different is that the cranberry is proving to be an equal-opportunity defender, its functional phenolics and chemical constituents conferring a wide range of health benefits beyond the urinary tract alone. So maybe we can have it all? Cranberry supporters are keen to find out.

UTIs and You
Whether they affect you or not—and if you’re a woman, they probably do—urinary tract infections are serious business. “UTIs are among the most common bacterial infections treated in women, which is why they garner so much interest,” says Cindy Taccini, director of global health communications at Ocean Spray.

According to statistics from the National Institute of Diabetes and Digestive and Kidney Diseases, UTIs are the second-most common type of infection in humans, triggering roughly 8.1 million doctor visits per year. Women are particularly susceptible—thanks in part to their shorter urethras, which has ten bacteria’s trip to the bladder—putting their lifetime risk of getting a UTI north of 50%. Moreover, says Dean Mosca, president, Proprietary Nutritional Inc. (Kearny, NJ), “Once an individual has had a UTI, the likelihood of having another escalates.”

Prevention is key, he emphasizes, as antibiotics aren’t a long-term solution, due to the possible development of antibiotic resistance and detrimental effects on good gut bacteria.” A 2014 World Health Organization report on global antibiotic resistance noted that resistance to one of the drug classes most widely used to treat Escherichia coli—caused UTIs—the fluoroquinolones—was already so widespread that, in some parts of
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*US RDI = Reference Daily Intake in 21 CFR 101.9(c)(8)(iv)
the world, the drugs are ineffective in more than 50% of patients. No wonder, Taccini says, that WHO considers antibiotic resistance “one of the greatest challenges to public health today, and one that makes leveraging cranberry’s benefits important.”

**Resistance Fighters**

That the humble cranberry might bend this curve seems a stretch. But, says Mosca, “Unlike antibiotics, which kill bacteria, cranberry works by changing bacterial structure and preventing adhesion to tissues, providing for effective prevention without the risk of developing antibiotic resistance.”

We know this now, but it took the research community a while to figure out. As far back as the 1700s and 1800s, Mosca says, researchers were already investigating cranberry and seized upon its ability to acidify urine as a possible mode of action—although further research failed to support it. So while cranberry stayed popular for urinary health, “its true mechanism remained a mystery.”

That changed in the early 1980s when research appeared in the *Journal of Urology* showing that cranberry inhibited *E. coli* adherence to urinary-tract epithelial cells by 80%, a finding that human clinical trials later confirmed. Subsequent research then focused on cranberry’s condensed tannins—antioxidant flavonoids known as proanthocyanidins, or PACs—as the source of the anti-adhesive effect. “These compounds adhere to the fimbriae of the bacterial surface,” Mosca explains, “thus preventing adhesion to the mucosal lining of the bladder.” And that makes it easier to flush bacteria out with urination. “In 1991,” he says, “this finding was duplicated by Israeli researchers and published in the prestigious *New England Journal of Medicine.***

Studies continue to support cranberry’s effectiveness. “The largest clinical trial” of its kind, published last year in *The American Journal of Clinical Nutrition*, showed that drinking an 8-oz, or 240-ml, glass of cranberry juice a day reduces symptomatic UTIs by nearly 40% in women with recurrent UTIs, reducing the burden of UTIs and the antibiotic use associated with treating recurrent UTIs,” Khoo notes. “The study showed that 30 courses of antibiotics were avoided in women with symptomatic UTI during the course of the six-month study period.”

**Go Whole**

And though cranberry PACs “have taken center stage as the cranberry component responsible for its bacteria-blocking benefits,” Khoo continues, scientists are gaining “exciting insights” into other cranberry constituents that contribute to the bacteria-blocking effect, including flavonoids and “newly discovered” xyloligucan oligosaccharides. “Researchers now believe cranberry’s ability to block bacteria is due more to its combination of compounds working together than to a single component,” she says. “This unique blend of bioactive components is what makes the cranberry such a powerful fruit.”

And the idea of delivering cranberry’s whole spectrum of benefits via whole-berry ingredients is increasingly popular with cranberry processors and brands, too. Notes Dan Souza, vice president, sales and marketing, and category manager for urinary, cardiovascular, and cognitive health, Naturex-DBS (Sagamore, MA), “What we’ve found is that Nature knows more than we do.”

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Women’s Health

UTIS: THEY’RE NOT JUST FOR WOMEN ANYMORE

Talk about gender equality! Yes, urinary tract infections are practically synonymous with “women’s health,” and women suffer from them at rates about four times those of men. Even so, men still get ‘em.

This fact did not escape Dan Souza, vice president, sales and marketing, and category manager for urinary, cardiovascular, and cognitive health, Naturex-DBS (Sagamore, MA), who realized that treating urinary health solely as a women’s issue left half the population—and half the potential market for cranberry-based remedies—unaddressed.

“So we did a lot of digging to see what other applications we could find for cranberry,” he says, “and we saw that it actually works well for men’s urinary symptoms.” When men hit their 40s and 50s, age-related prostate enlargement produces lower urinary tract symptoms—“think frequency of having to go to the bathroom, waking up to have to go to the bathroom or, on the other end of the spectrum, a hesitancy to go to the bathroom, or not being able to get started,” Souza says.

Clinical trials on his company’s standardized cranberry ingredient yielded evidence of symptom relief, including “great data on men’s overactive and underactive bladder symptoms.” There’s a $5 billion per-year market for the drugs in that space, he says, but the drugs induce side effects that no one—male or female—likes. Cranberries, refreshingly, have no known side effects. Having started clinical trials in women, too, the company’s “hoping that the mechanism is similar in men and women and that we’ll be able to get some good clinical results there, as well,” he says.

Beyond UTIs

When we do, we realize that cranberry’s benefits go beyond the bladder—or the entire urinary tract. Indeed, says Mosca, “Any common pathogenic bacteria that can colonize through adhesion is definitely a target for either prevention or eradication.” In fact, “some general studies on cranberries suggest that they may tackle more than just the one pathogen that causes urinary-tract and bladder infections.”

For example, the bacteria that causes stomach ulcers, Helicobacter pylori, infects about half the world’s population, according to the World Organization of Gastroenterology, and “research suggests that cranberry’s antibacterial properties may help promote stomach health in certain adult populations by suppressing H. pylori,” Khoo says.

Cranberries are even good for the mouth—and not just because they taste great. “Emerging studies suggest that cranberry can help promote oral health by reducing the activity of cavity-forming bacteria,” Khoo says. “Specifically, cranberry extracts reduced inflammatory responses to oral bacteria and/or bacterial growth.”

Khoo adds that research has expanded to encompass more of the fruit’s antimicrobial effects, including its action against bacterial aggregation, growth, and biofilm formation. “Emerging data also suggest that cranberries have probiotic properties that promote ‘good-bacteria’ growth and activity,” she says.

Some general studies on cranberries suggest that they may tackle more than just the one pathogen that causes urinary-tract and bladder infections,” says Dean Mosca.

Gut Instincts

As a foil to the antibiotics that often do the exact opposite, the notion that cranberries might actually promote gut health is encouraging. And here again, Khoo says, the main player appears to be PACs, “as these large polymeric compounds can be metabolized by gut flora to yield bioactive components that can impact the immune system in the gut and confer anti-inflammatory properties or provide food for the gut biome.” An “elegant” review on the subject by Cires et al. appeared in Frontiers in Nutrition in 2016, she says.

Stephen Lukawski BA, M. Ed, director of business development and global sales, Fruit d’Or Nutraceuticals (Notre-Dame-de-Lourdes, QC, Canada), notes that his company teamed with UAS Labs (Wausau, WI) to conduct a cranberry-probiotics study, now published in the Journal of Functional Foods. The results held that the pairing of whole-fruit cranberry with probiotics inhibits in vitro invasion of gut epithelial cells by extra-intestinal pathogenic bacteria (ExPEC). "The standardization of soluble and insoluble PACs derived from whole-fruit cranberries reduces the invasiveness of ExPEC," he says, "and c-PAC inhibition of ExPEC invasion was not hindered by the probiotic component."

The company also partnered with Sabinsa (East Windsor, NJ) to show that Fruit d’Or’s organic cranberry-seed powder, standardized to a minimum 3% PACs and combined with Sabinsa’s LactoSpore Bacillus coagulans probiotic, acted prebiotically and “was more effective by 200% than fructooligosaccharide or inulin,” Lukawski says. The cranberry-seed powder, with its protein and fiber, provided...
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"We need higher-quality testing for the standardization of bioactive markers, such as PACs, to stop companies from selling inferior cranberry ingredients," says Stephen Lukawski.

handy nitrogen and carbon fuel for the Bacillus coagulans strain, it appears. Lukawski’s conclusion: "Cranberry juice plus probiotics plus prebiotics equals a great synbiotic gut formulation."

Measuring Progress

While research credits cranberry’s panoply of bioactives for making it so effective in these conditions, it’s still the fruit’s PACs that garner the most attention—from scientists, brands, and consumers. And as consumers get savvier about cranberry’s benefits, they’ll start scanning product labels for PACs specifically, and at specific levels.

And yet, says Cal Bewicke, president, Ethical Naturals (San Anselmo, CA), "Many types of cranberry extract and concentrate products are offered with specifications according to ratios or other methods, which can be very confusing to a consumer trying to find a good source of material to use." Further, accurately measuring cranberry’s A-type PACs, which he says are those linked to improved urinary, oral, and gut health, "has always presented a challenge due to their structural complexity and degree of polymerization."

Methods ranging from colorimetry, chromatography, and mass spectrometry all aim at precisely measuring the fruit’s key actives, and hopes the industry goes further. "We need higher-quality testing for the standardization of bioactive markers, such as PACs, to stop companies from selling inferior cranberry ingredients and so consumers can identify quality," he says. "We even think DNA authentication "to prevent adulteration" is a good idea. Simply relying on cranberries’ healthy halo alone "hurts us all," he says.

It’s All in the Ingredient

By contrast, Souza thinks companies should "stay away from the standardization game" and just show that a cost-effective amount of cranberry delivers strong activity, as demonstrated in clinical trials. "Depending on the application we’re going for," he says, "we’ll use different ratios of the different parts of the cranberry. So there are certain applications where maximum PACs are the best solution because you might need something that’s water soluble and has quick uptake—say, for oral health." Other applications will require a different blend.

Ultimately, he says, "We continue to try to make it easier for customers by giving them efficacy, traceability, identification, non-adulteration, and safety data—all the checkmarks you need as a sourcing manager."

And because today’s cranberry ingredients come in everything from concentrates and extracts to powders and dried berries themselves, they let brands "take advantage of opportunities for product innovation," Taccini says. One of the assets of powders and concentrated cranberry extracts from whole fruits "is that they can be incorporated into a variety of products like baked goods, cereals, and waters while maintaining the cranberry components that are important for health and functionality," she adds. "They also contribute great taste."

And they’re recognizable as real, whole fruits—perhaps even "superfruits." At a time when "consumers simply want more fruit in their diets," Taccini says, this alone puts cranberries "up to the broader idea of being a superfruit." [N]

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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Best Face Forward

The right packaging is critical as natural products vie for attention.

BY MAUREEN KINGSLEY

One could reasonably argue that natural-product branding, including packaging, is almost more important than the product itself—at least initially. The sheer volume of functional-food and beverage products, nutritional supplements, and other natural wellness products vying for consumer attention and dollars online and on retail shelves requires brands to be deliberate and innovative in their branding and packaging strategies. The risks of not doing so include losing customers to brands that more effectively attract, relate to, and engage with them. In fact, a poorly branded natural product may remain completely unknown.

Indeed, when branding and packaging a functional food, a functional beverage, or a nutritional supplement, hastiness, corner-cutting, unimaginative thinking, and ignorance of the target customer will save the company a few bucks early on but will likely prove disastrous later within the ultracompetitive retail market. Fortunately, an understanding of the significance of effective branding, along with the foresight and willingness to allocate ample time and resources to it, can assist a product in cutting through the clutter of similar products and earning the attention and loyalty of customers.

Branding 101: Above All Else, Know Your Customer

Packaging is one element of the overall branding strategy, and when developing that strategy, consumer research matters. "Functional-food and nutritional-supplement brands should be based on an understanding of a core or target consumer," says Clark Goolsby, vice president, creative director, Chase Design Group (Los Angeles). "Learning their needs and what attracts them is the result of good research." This research includes convening focus groups and conducting online surveys to target customer feedback, says Jeff Hilton, cofounder and chief marketing officer of BrandHive (Salt Lake City), as well as "tapping into" existing secondary research that illuminates generational preferences and category usage trends. Plus, Hilton adds, "talking to your retail accounts and sales brokers will provide insights that might otherwise go undiscovered.

Along with all of this research comes appropriate audience segmentation to aid in shaping and fine-tuning the branding approach. "In today's consumer marketplace," Hilton warns, "it is all about segmenting your audience. Trying to speak to too many audiences is a common problem. Usually you end up talking to no one."

Aligning Package to Brand

An understanding of the customer and a segmentation of audience will help guide
ENI’s Cranberex™ is a concentrated, standardized Cranberry extract that represents a powerful advance in the delivery of Cranberry’s most active constituents: the unique proanthocyanidins (PAC’s) containing the ‘A-type’ linkages that don’t occur in PAC’s from other tannin rich foods.

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- Levels of ‘A-Type’ PAC’s in Cranberex™ correspond to most effective clinical trials of Cranberry extracts
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“Trying to speak to too many audiences is a common problem,” says BrandHive’s Hilton.
“Usually you end up talking to no one.”

the branding strategy and overall message, a component of which is the packaging of the product. “The packaging is an expression of the brand, just like your physical body is an expression of your soul or essence,” asserts Yadim Medore, founder and CEO of Pure Branding (Northampton, MA). “If the packaging isn’t in alignment with that essence, there will be a major disconnect between what the brand stands for and the meaning conveyed at shelf,” and the product will be overlooked, he says.

Medore points to his company’s work with herbal-supplement brand Gaia Herbs as an example of how brand and packaging can be brought into harmony. “When Gaia Herbs came to us, their core brand message wasn’t clear and didn’t foster a connection with consumers or inspire retail staff to recommend their products. And you could see that with the packaging. It was a mishmash of designs and messaging.” (See lefthand photo below.) Pure Branding and Gaia Herbs worked together to create the Meet Your Herbs campaign, comprising a traceability program and opportunities for further consumer engagement. As part of this rebranding effort, Pure helped organize Gaia’s extensive product offering into four lines based on the “four distinct need states” in which people shop for herbal supplements. Medore explains, to get “the right herb to the right person at the right time.” The rebrand included a new logo “designed to invite brand-name recognition” and new packaging that “celebrates Gaia’s clinical and consistent nature while answering ‘What’s in it and what will it do for me?’ on the front of every package.” The “Meet Your Herbs” and “Plant Intelligence” taglines appear on each Gaia Herbs package, too.

Medore says these packaging elements work together to create a “memorable” impression on the target customer in that “anyone looking for Gaia Herbs on the shelf knows exactly what to look for,” and he says Gaia’s packaging as a whole offers “extreme clarity” and opportunity for further engagement.

Packaging company Nosco (Gurnee, IL) shares Pure Branding’s philosophy that branding and packaging should align, particularly for natural products, and that the two must work together to convey a clear message to a target consumer.

Packaging company Nosco (Gurnee, IL) shares Pure Branding’s philosophy that branding and packaging should align, particularly for natural products, and that the two must work together to convey a clear message to a target consumer.

“Packaging is the billboard that sells your messaging,” Nosco’s packaging advisor, Brent Anderson, says. “It should communicate clearly and consistently, and align with the message of the rest of your marketing materials.” As for designing packaging specifically for natural-health products, Anderson succinctly states: “Super-cluttered is bad. Super-simple is good.” He also points to the importance of knowing one’s category and designing packaging accordingly. “One of the best examples of this,” Anderson explains, “is the difference between the sports-nutrition-supplements category and the vitamin-and-mineral-supplements category. Packaging for the former is often bright, vibrant, bold, and strong. It may incorporate metallic materials or textures.” On the other hand, he continues, vitamin and mineral packaging is “usually soft, comforting, reassuring, and more likely to contain recycled materials.” These differences are deliberate.

One particular category, fresh-pressed juice, provided inspiration for Chase Design Group’s branding and packaging of Pressed by KIND bars, a natural, nutritious snack food. Chase’s Goolsby says his firm leveraged the image of simplicity, healthfulness, and freshness evoked by many fresh-juice labels in its design of the Pressed by KIND packaging: “Many juice [brands] choose to simply use the color of the juice combined with typography to communicate their ingredient stories. We took a similar approach. By using the vibrant colors of the ingredients..."
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For natural products, science and substantiation are relevant and worthy of addressing in packaging; however, beware of prioritizing them above all else.

For natural products, science and substantiation are relevant and worthy of addressing in packaging; however, beware of prioritizing them above all else. "This is the number-one trap we see brands in this space fall into," Pure Branding’s Medore states. "Every brand we’ve ever worked with claims they have the best science. And that may be true, but for the consumer it’s just noise." He further explains that science serves an important purpose in “credentialing. It needs to be there and validates the decision to participate with a brand. But it is not a compelling differentiator that gets me to participate," he explains. His perspective is that science and quality are “costs of entry” and viewing them as more than that is unwise. What matters most, he continues, is the emotional connection you can make about who you are as a brand and the “why” of what you’re doing. "Lead with the passion, support it with science," he asserts.

Likewise, Anderson of Nosco says that “first and foremost, it’s important to focus your messaging on your customer.” He does recommend marketing a product’s special differentiators, if any, but overall, "you want to clearly convey your value proposition with your packaging, labeling, and marketing," he advises.

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.

Packaging

For natural products, science and substantiation are relevant and worthy of addressing in packaging; however, beware of prioritizing them above all else.

For product-line and branding consistency, Chase Design Group made sure it incorporated KIND’s recognizable grid-based packaging layouts into the packaging of the new bars.

Natural Product Packaging: What’s Working Right Now

Not surprisingly, specific trends in natural product packaging currently center on the concepts of cleanliness and simplicity. Nosco’s Anderson lists clean labels, clear packaging, and transparent packaging among these.

BrandHive’s Hilton points to the strategic use of white space, which happens to be evident in Pure’s rebrand of Gaia Herbs. Hilton also notes the use of form and function differentiation, particularly through unique delivery formats, such as sprays, shot bottles, and squeeze pouches.

Packaging that provides opportunities for customer engagement is also key and is cited by brands and marketing companies alike. QR codes, expanded labels, and hang tags all “interrupt the retail experience” for the customer in a good way, Hilton explains, by inviting a deeper dive into the brand.

Packaging for Online Sales

One cannot discuss branding and packaging of supplements and functional foods/ bev- erages without considering the various sales channels—particularly online storefronts. While no manufacturer, brand, or marketer would dispute the significance of Internet-based presentation, sales, and customer engagement, different philosophies do exist in how to approach online versus brick-and-mortar marketing.

On one hand, Pure Branding’s Medore points out that channel boundaries “are more and more getting blurred” as products become almost equally available and accessible in both mainstream outlets and natural stores, and online. “More natural consumers spread their buying to multiple locations,” he says. “So think less about the channel and more about who the brand participants are that you are targeting. They may cross channels, but that does not change who they are and what they are looking for.”

He does add that brands should “think about all packaging as being online, only a click away from more information.”

On the other hand, Chase Design Group’s Goolsby believes that shopping for natural products online is a “very different experience” than shopping in a traditional retail outlet, and that brands need to understand how consumers encounter and interact with products online. “Packaging designs need to be engaging at thumbnail scale,” he points out.

Nosco’s Anderson adds that, online, “decorative features aren’t as important. They become more so when you are touching the product.” Online, he explains, the consumer has fewer senses with which to work. That consumer can’t physically touch the packaging, he points out, so “unique structures, soft touch, and metallic or shimmer are not necessarily conveyed well.” However, Anderson adds, online, brands have “complete control over how they and their products are represented. You’re limitless when it comes to creative graphic elements and shapes, which is important because customers need to remember the package and want to buy it again.”

In a brick-and-mortar store, he says, brands are limited to certain structural designs that will work well on a shelf and “what’s allotted to them in a plan-o-gram.” Additionally, retail is more competitive, Anderson asserts, and brands don’t have control over lighting, shelving color, “or even who their neighbors are.”

A Word About Science

For natural products, science and substantiation are relevant and worthy of addressing in branding and, by extension, packaging; however, beware of prioritizing them above all else. “What’s allotted to them in a plan-o-gram,” Medore advises.
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Twice as Complicated?
Making sense of FDA’s new dual-column Nutrition Facts Label requirement for two-to-three servings

BY MAYA WILSON, LABEL & REGULATORY COMPLIANCE CONSULTANT, ESHA RESEARCH

In the United States, the majority of packaged food products can accommodate the standard Nutrition Facts label, making it the most commonly used label format on store shelves. When FDA finalized its new U.S. Nutrition Facts rule in 2016, one of the label’s most notable changes was the addition of a new dual-column requirement for packages containing two-to-three servings.

There are four different dual-column label formats:

- For food that requires further preparation (such as dry cake mixes or dry pasta products)
- For food that is commonly combined with other ingredients (such as cereal plus milk)
- To show % Daily Values for two different Recommended Daily Intakes (such as for a child and for an adult)
- To show nutrition information for two serving sizes. In this case, the purpose for this dual-column label is to indicate to consumers the nutrition facts for one serving and for the entire package.

The dual-column label is voluntary in all of the cases above except for the last one. With the new regulations, containers that have between two and three servings in them are now required to use the dual-column label to show nutrition information for a single serving and per the whole container.

When evaluating if your product will now require a dual-column label, you will also want to review the following: changes in the Reference Amount Customarily Consumed (RACC), serving size, nutrient content claims, and exemptions.

RACC Changes
According to the FDA, "by law, serving sizes must be based on amounts of foods and beverages that people are actually eating, not what they should be eating. How much people eat and drink has changed since the previous serving-size requirements were published in 1993." As such, the FDA has updated some of the Reference Amounts Customarily Consumed (RACC) serving sizes to reflect serving sizes that Americans actually eat. For example, the RACC serving size for carbonated beverages, such as soda, has increased from 8 fl oz to 12 fl oz. This is important because the RACC determines what your package's serving size is and what nutrient content claims you are eligible to make.

Serving Size
In order to define your package's serving size, you should first reference the FDA’s RACC Table to determine what the agency would consider your product's serving size to be and how many servings are in one package. This will determine if you need a dual-column label or not. For example:

- If the product weighs 200%–300% of the RACC, serving size = Dual-Column Label Required

For example, if the RACC for a cookie is 30 g:

- A package that contains one 1 g–15 g cookie, serving size = 1
- A package that contains one or more cookies with a total package weight of 15.3 g–19.8 g, serving size = 1 or 2
- A package that contains one or more cookies with a total package weight of 20 g–59.7 g, serving size = 1 (and falls under the single-serving container rule)*
- A package that contains one or more cookies with a total package weight of 60 g–90 g, serving size = Dual-Column Label Required

Single-Serving Container Rule
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Vitamin D is rightly regarded for its crucial role in supporting healthy bones, but its influence extends far beyond the skeletal system. As a regulator of gene expression for more than 3% of the human genome, vitamin D’s extraskeletal (acting outside of the skeletal system) potential is vast. This hormone-like vitamin is involved in a wide array of biological functions, including immune health, cardiovascular function, metabolic balance, muscle strength, and blood sugar metabolism.1

A plethora of research is showing that vitamin D participates in multiple aspects of cellular metabolism and cellular differentiation. Its influence on immune function extends to the innate and adaptive immune system, and it also has anti-inflammatory effects. In the area of cardiovascular health, numerous studies point to an increased risk of cardiovascular events with lower vitamin D levels. Similarly, elevated vitamin D levels decrease the likelihood of hypertension.2

Two unique areas of emerging science surrounding vitamin D include aging and cognitive health. As additional research is conducted in these areas, it is becoming clear that vitamin D plays a significant role in keeping cells healthy, vital, and youthful, as well as in maintaining brain function with advancing age.

**Vitamin D and Aging**

Telomeres are end caps on chromosomes that have received increased attention over the years because of their association with cellular aging and their relationship to the development of age-associated chronic conditions. In general, longer telomere length is associated with a reduced risk of chronic conditions and better cellular health. Thus, telomere length may be a potential marker of biologic aging. Telomere dysfunction in cells occurs for several reasons and is often a result of the aging process itself.3 Cardiovascular disease and diabetes, among others conditions, are characterized by an increased rate of telomere shortening, which indicates an increased effect of these disease conditions on the aging of the body.4

Vitamin D insufficiency has been linked to the onset and prevalence of numerous chronic health issues, and it is well-known that vitamin D impacts many aspects of cellular aging through its influence on various aspects of cellular metabolism. In many studies, researchers have found vitamin D to be associated with telomere length, a possible explanation for vitamin D’s potential role in delaying cellular aging.5

A newly published study led by Mohsen Mazidi of the Chinese Academy of Sciences (Beijing, China) evaluated telomere length in participants of the National Health and Nutrition Examination Survey (NHANES).6 The study sample included 4,347 participants with an average age of 42.7 years. The authors found that for each increment of serum 25-hydroxyvitamin D above 50 nmol/L, further suggesting genomic instability in those with lower levels of vitamin D. An earlier analysis conducted by Jason Liu and colleagues from the Harvard School of Public Health (Boston, MA) and the University of Tromsø–The Arctic University of Norway (Tromsø, Norway) also used NHANES data from 2001-2002 and stratified their analysis of telomere length by age, dividing the subjects into young adults (age 20-39), middle age (40-59), and older age (greater than 60) segments.7 Measuring leukocyte telomere length via polymerase chain reaction techniques, the investigators found that middle-aged adults with 25(OH)D concentrations above 50 nmol/L had significantly longer telomeres than those with levels below 50 nmol/L, further suggesting genomic instability in those with lower levels of vitamin D. An earlier analysis conducted by Jason Liu and colleagues from the Harvard School of Public Health (Boston, MA) looked at participants from the Nurses’ Health Study.8 Included in the analysis were 1,424 participants who had plasma samples taken in 1989–1990. The researchers found that higher serum levels of 25-hydroxyvitamin D were significantly associated with longer telomere length.
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Vitamins

Higher levels of vitamin D may have a protective effect on cellular aging.

While the studies highlighted above indicate that vitamin D concentrations are associated with positive benefits for telomeres, a previous study assessed the impact of vitamin D supplementation on telomerase activity in African American participants. Telomerase is an essential enzyme that functions to maintain telomere length. Led by Haidong Zhu of Georgia Health Sciences University (Augusta, GA), this four-month double-blind placebo-controlled study enrolled 57 healthy African American men and women. Each month, participants were supplemented with 60,000 IU vitamin D₃ or a placebo. As plasma 25(OH)D levels increased substantially in the supplementation group from baseline to the end of the four-month period, telomerase activity significantly increased by an average of 19%. This remained unchanged from baseline in the placebo group, indicating that vitamin D supplementation could support the function of this important enzyme in the study population.

These studies suggest that vitamin D is an important nutrient for healthy cellular aging. Higher levels of vitamin D may, therefore, have a protective effect on cellular health and have implications for aging as well as prevention of several chronic conditions.

Vitamin D and Cognitive Health

Vitamin D plays an important role in normal brain functioning by acting on several processes relevant to brain health. Some of these mechanisms include its ability to influence neural transmission, neurogenesis, preventing neuronal death, and clearing amyloid proteins. Additionally, vitamin D likely has antioxidant and anti-inflammatory activity in brain tissue, which supports against degenerative processes.

Several studies have attempted to clarify the relationship between vitamin D and cognitive function as well as vitamin D's role in the development of dementia. The findings have been mixed. A newly published meta-analysis conducted by researchers in Austria looked at the potential role of vitamin D deficiency as a risk factor for dementia. Evaluating studies published between 1990 and 2015, the researchers identified five cohort studies looking at dementia risk in relation to vitamin D deficiency. The meta-analysis showed that those individuals with 25(OH)D levels below 25 nmol/L had significantly higher risk of dementia than those with levels greater than 50 nmol/L. While this was an interesting finding, the authors cautioned that the strength of the evidence is weak since the studies were only of an observational nature. Furthermore, in a cohort of 1,182 Swedish men with an average age of 71, after 18 years of follow-up, researchers found no association between serum vitamin D levels or vitamin D intake with long-term risk of dementia or cognitive impairment.

Vitamin D has, however, recently been found to positively influence a physiological process that may be important for prevention of Alzheimer's disease. Brendan Miller and colleagues from Arizona State University (Phoenix, AZ) conducted a randomized pilot study in which they examined the effect of vitamin D supplementation (50,000 IU/wk) for eight weeks on levels of amyloid-β protein, low plasma levels (and elevated brain levels) of which
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are linked to Alzheimer’s disease. In this small study (average age of 64), researchers found that vitamin D supplementation increased plasma amyloid-β levels, suggesting decreased brain levels of this protein.

Additional studies, including those assessing the effects of vitamin D supplementation, have shown cognitive benefit. In a randomized trial led by Jacqueline Pettersen at the University of British Columbia (Vancouver, Canada), researchers included 82 healthy adults with insufficient vitamin D levels (<75 nmol/L) to assess the effect of a low dose (400 IU/d) versus a high dose (4,000 IU/d) of vitamin D. Over the course of the 18-week study, researchers assessed cognitive performance using standardized tests of cognitive function. Significant improvements were noted on a pattern-recognition memory task as well as the paired associates learning task (assessments of visual memory) in the high-dose vitamin D group. No similar changes were noted in the low-dose group. Measures of verbal memory did not change in either group.

In another study, the same group of researchers evaluated the relationship between serum levels of vitamin D and executive functioning in 142 healthy adults. They stratified individuals at baseline into four groups based on vitamin D status: insufficient (<50 nmol/L), high sufficient (50 to 75 nmol/L), high sufficient (75 to 100 nmol/L), and supra-therapeutic (≥100 nmol/L). After assessing the subjects following four tasks of executive functioning, they found that those in the supra-therapeutic vitamin D group performed significantly better on verbal memory tasks than participants with lower serum levels of vitamin D. The authors propose that higher levels of vitamin D, beyond those deemed sufficient for bone health, may be needed to achieve optimal benefits for cognitive function.

Researchers from Rutgers University (New Brunswick, NJ) and University of California, Davis (Davis, CA), recently conducted a longitudinal study in an ethnically diverse cohort to examine the association between vitamin D status and cognitive decline. In the study, 382 older adults with a mean age of 75.5 were followed for an average of 4.8 years. In addition to white individuals, the study included African American, Hispanic, and a small percentage of other ethnicities. Vitamin D levels were assessed at baseline and at yearly follow-up visits. The average baseline serum 25(OH)D concentration was 19.2 ng/mL (47.9 nmol/L), with 26% of the participants classified as vitamin D–deficient and 35% insufficient. Nearly 50% of the participants were classified as cognitively normal at baseline, while 33% had mild cognitive impairment and 17% had a diagnosis of dementia. At the end of the study, the researchers found that the rate of decline in executive function and episodic memory in vitamin D–deficient and insufficient groups significantly exceeded the decline in those with adequate vitamin D status. These results as well as others point to the potential significance of vitamin D in supporting healthy cognitive function with age and lend support to the possible ability of the vitamin to reduce the risk of cognitive disease.

Scratching the Surface
As a vitamin that functions more like a hormone and influences a broad range of physiological processes, vitamin D’s necessity for health is quite evident. Research continues to shed light on the potential actions of this unique vitamin.

Given research indicating widespread insufficiencies in a large segment of the population coupled with potential therapeutic effects of sustaining higher levels, ensuring an adequate intake of vitamin D may be good insurance to support the body and brain against the inevitable effects of aging.

&&

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

References
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Diving into Drinks

Beverages continue to be the next frontier for marine ingredients. What progress have fish oil and algal-ingredient suppliers made?

BY JENNIFER GREBOW, EDITOR-IN-CHIEF

Marine ingredients, such as those from fish and algae, are in an enviable position. Many have already found success in the dietary supplements space. The next opportunities are now in food and beverage, and as such, companies are now trying to drive a deeper stake in the food and beverages market.

Marine ingredients famously come with their own set of challenges, including stability concerns plus a fishy taste and aroma. But thanks to innovation by experts, these challenges are largely being overcome.

Beverages

The beverage market is dynamic, and marine ingredients are catching the wave. Richard Staack PhD, MBA, vice president, research and commercial development, Prinova USA (Carol Stream, IL), says that consumers are already looking for omega-3 fortification for health benefits and are now turning to food and drinks to get it.

“For instance, "Consumer demand is high for functional beverages made with fish oil," Staack says. "The health benefit areas addressed by [omega-3 fatty acids] EPA and DHA are among the top trending consumer concerns, which include cognition, heart health, brain health, anti-inflammation, eye health, and joint health."

According to Staack, "Recent data supports that 50% of U.S. consumers believe they do not get enough omega-3s in their diets, while 38% of consumers specifically seek out omega-3s in the purchase of food and beverages." (Staack is citing 2017 figures from Innova Market Insights’ Innova Database.)

Beverages are also an ideal vehicle for customers such as children. Matt Phillips, vice president, business development, Bioriginal (Irvine, CA), points out that the omega-3 fatty acid DHA is increasingly popular for infants and children in terms of brain development and cognitive support. "Fortifying beverages such as milk and juice is a natural fit for this ingredient. That's because consumers already associate these beverages with health benefits and typically consume them regularly."

He adds that "the other benefit with this route is twofold: it enables you to differentiate in categories that are largely commoditized, and secondly, it typically does not require extensive awareness education for the market to understand and embrace cognitive-health benefits incorporated into their milk or juice."

Algal ingredients are also getting into beverages. Joe Kuncewitch, national sales manager, AstaReal Inc. (Burlington, NJ), says that, for instance, thanks to a special spray drying process, AstaReal astaxanthin (Haematococcus pluvialis) can be supplied in a water-dispersible powder called P2AF that can be incorporated in instant beverages. "The powder can be applied directly to liquid and mixed mechanically, or can be made into an effervescent tablet and added to the drink," he says.
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Spirulina blue-green algae is also getting into drinks. Beverage brand Smart Chimp launched its spirulina waters back in 2014. According to founder Benjamin Lacour, “The market is reacting in a good way.” Each Smart Chimp bottle contains 10 ml of fresh spirulina extract, which Lacour says is an efficacious dose to yield health benefits.

Vitamins and minerals derived from sea sources are also seeing greater appreciation in beverages. Aquamin is a branded ingredient gaining attention in the nutrition industry as a source of marine-derived minerals. The multi-mineral complex provides calcium, magnesium, and 72 other trace marine minerals because its source, seaweed, absorbs these trace minerals from seawater. According to the company, Aquamin’s unique, porous honeycombed vegetative cell structure gives it a number of significant benefits, from its chemical behavior to its absorption. It also is said to be formulated to offer superior taste, odor, color, and solubility.

“We typically find that Aquamin works especially well in fruit-based juices, fruit concentrates, and fruit preparation applications,” says David O’Leary, commercial manager of Marigot Ltd. (Cork, Ireland), the company that developed Aquamin. “In such applications, it can compete easily with dairy-based systems and other synthetic mineral sources—phosphates, lactates, etc. As it has a clean taste, is heat stable, and has a very good dispersion profile and clear solubility, it can be incorporated into all types of fruit beverage applications.” In addition to fruit beverages, O’Leary says the company has developed Aquamin grades for plant milks. The ingredient is also suited for water, smoothies, sports powders, sachets, stick packs, and gummies.

John Foley, applications scientist, BASF Nutrition & Health (Florham Park, NJ), says that in addition to its omega-3 ingredients, BASF has seen increased usage of its betatene natural mixed carotenoids, derived from algae, in beverage formulations. “It performs well in beverages such as vitamin waters and juices, and fortifies with provitamin A from natural beta-carotene, which is preferred over adding straight vitamin A [because] the body will only covert the beta-carotene to the amount of vitamin A it needs,” he says.

**Technologies to Make It Happen**

All of this activity in the drinks space is great, but it didn’t happen overnight. Firms have worked consistently to evolve their marine ingredients in order to make them as efficacious and enjoyable as possible in a drink matrix.

Some of the famous challenges marine ingredients struggle with include a fishy taste and aroma. Stability can also be a challenge. Ingredients like fish oil and even astaxanthin are known to oxidize faster when exposed to air. Another challenge? Kuncewitch says that when working with astaxanthin in particular, “one challenge can be the vibrant red color that astaxanthin imparts to beverages and food.”

“Omega-3 fatty acid fortification of beverages in the past has always been limited to cloudy beverages that need refrigeration and typically have a shorter shelf life than desired,” says Prinova’s Staack. “In addition, avoiding an impact on taste, odor, appearance, texture, or a phase separation in the finished product has always been a challenge.”

Prinova has found its way to overcome these challenges. The company has partnered with Oceans Omega (Montvale, NJ), a company specializing in omega-3 ingredients for liquid applications, including for fish oil ingredients (EPA/DHA) and algae (DHA). Staack says the company’s proprietary omega-3 stabilizing technology “was designed for effectively protecting omega-3 fatty acids from oxidation in micro-emulsions. Additionally, the technology allows a quality omega-3 emulsion to retain excellent organoleptic properties throughout any beverage manufacturing process and is shelf-stable in functional beverages at ambient temperatures.” He says this allows for clear, transparent, shelf-stable omega-3-fortified beverages, including juices, teas, sports drinks, and functional waters. “Regarding the types of beverages that are better suited for fish oil ingredients, we find it works well in dairy products, apple juices, fruit juices, and flavored waters,” he adds.

BASF uses encapsulation to overcome omega-3 challenges and also to take ingredients a step further. “BASF has innovated an omega-3 ingredient encapsulated with dairy protein that contains 10%–13% EPA and fortifies with provitamin A from natural beta-carotene, which is preferred over adding straight vitamin A [because] the body will only covert the beta-carotene to the amount of vitamin A it needs,” he says.

**WHAT ABOUT KRILL?**

Is krill oil getting in on all this food and beverage action? Not quite yet, according to krill oil specialist Aker BioMarine Antarctic (Oslo, Norway).

“Due to a history of technical limitations, as well as price, krill oil just hasn’t found life in foods and beverages like other omega-3 sources have,” says Becky Wright, marketing director, Aker BioMarine. “I don’t necessarily think it is more difficult” to include krill oil in food and beverage, she adds. “I just don’t think there has been a justification yet to explore these types of applications.”

But that’s not to say that krill oil couldn’t make its way into those products one day. “Now that krill oil has become the second-largest commercially available source of omega-3s EPA/DHA, I think many companies, including ours, will start pursuing this market more strongly in the future,” Wright says. “The application of omega-3s EPA/DHA from marine sources, mainly algae and fish oil, has had some success in foods and beverages. And given their success, we are confident that krill oil will also have a place in this market in the coming years.”

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Marine Ingredients

plus DHA, perfect for a heart-health-booster concept, as well as a similarly encapsulated high-DHA powder that is ideal for kids’ products,” Foley explains. “These ingredients have a two-year shelf life at room temperature and are suitable for use in dairy products, dry dairy-based beverage mixes, and nutrition bars.”

Bioriginal’s OmegaPure fish oil is refined to eliminate undesirable odors and taste, while retaining the nutritional benefits of EPA and DHA. Phillips says the ingredient can be included in foods and beverages, including milk, juice, and other ready-to-drink beverages, without impacting taste or flavor. It “does really well in refrigerated beverages,” he adds. “This is because the cooler temperature prolongs shelf life. In fact, we conducted in-house trials last year and found that when OmegaPure fish oil is used in beverages like milk, for example, consumers are either unable to discern a difference, or they prefer the fortified sample.”

Virun (Pomona, CA), is a company specializing in clear, water-soluble, shelf-stable solutions for ingredients like omega-3. One of its latest advancements is its Esolv emulsifier, which enables water-insoluble marine ingredients like EPA, DHA, and astaxanthin to become water soluble or dispersible.

“Esolv is an emulsifier that is a natural vitamin E oil we polymerize through natural emulsification into water and then remove all the free polymer as well as water. The end Esolv, being that it was emulsified into water, retains its polar properties and becomes what is called ‘amphiphilic,’ which forms micelles,” says Philip Bromley, CEO of Virun (Pomona, CA). The result is also clean label, since vitamin E is used as the excipient, he adds.

Virun is using this technology not only to get fish oil EPA/DHA ingredients into beverages; it’s doing the same for astaxanthin. Thanks to a partnership with Israel-based astaxanthin supplier Algatechnologies Ltd., Virun used Esolv technology to create a water-soluble version of Algatechnologies’ AstaPure astaxanthin ingredient. “Pouches, 2-oz shots, multi-serving smoothies, as well as finished beverages all have been successfully developed and, in many instances, commercialized,” Bromley says.

Just as with fish oil, challenges like taste, texture, and solubility are common to algae-based ingredients. Luckily, suppliers are working on solutions. In addition to its P2AF water-dispersible astaxanthin powder, AstaReal utilizes an emulsification process called Clear 100 to produce a water-soluble liquid form of AstaReal astaxanthin. It can be used to incorporate astaxanthin into beverages, as well as gummies, jellies, and candies. “It dissolves to produce a completely clear astaxanthin liquid,” Kuncewitz says.

And when developing Smart Chimp’s spirulina water, Lacour says he tested numerous recipes before arriving at the final formula. “That was a real challenge all the way,” he says. "I probably tested hundreds of recipes in my kitchen to reach the perfect taste. Microlaqué are very strong in taste, and the texture could be a little thick depending on the concentration, so we had to come out with an extraction process to get rid of the taste and keep the benefits at the same time. But the most difficult part was definitely to stabilize the formula, which we did with a partner lab here in France.”

BASF’s Foley has an important tip for those dabbling in omega-3 fortification. “In addition to ‘controlling your process’ and limiting exposure to heat and oxygen, he says, “the greatest challenge in fortification is knowing your fortification limit (typically 30-75 mg EPA and DHA per serving).” Some companies also still recommend that beverages containing their marine ingredients be refrigerated after opening.

More in Store

While this article focuses largely on the beverage space, make no mistake that these same companies are also expanding into increasingly varied—and creative—food uses for their marine ingredients. Here is just a sampling.

Bioriginal’s Phillips says that OmegaPure can be included in desserts, baked goods, condiments, cheeses, and bars. It also blends well in frozen treats like ice cream. In fact, the company says, OmegaPure even has the ability to improve the mouthfeel of these products.

Prinova’s Staack says the Oceans Omega stabilizing technology helped produce a commercial omega-3-fortified gelatin product with 32 mg of DHA per cup. “Other food products that are ideal for omega-3 fortification with this technology and have not seen much innovation over the years include gummy bears, applesauce, and gelatins,” he adds.

BASF’s Foley says, “Refrigerated dairy products that are low in fat and flavored, such as low-fat chocolate milk or fruit yogurt, are great candidates for omega-3 fortification.” Nutrition bars, as well as high-fat products like peanut butter, margarine, and salad dressing, are also ideal opportunities, he says.

Bromley says that Virun continues to “focus on even crazier concepts,” including an omega-3 EPA/DHA butter, astaxanthin red raspberry waffles (“with yummy EPA/DHA beadlets inside that taste like raspberry jam-infused berries”), and pancakes with 300 mg of DHA per pancake.

The bottom line is that marine ingredients can’t ignore the growing food and beverage market if they want to increase their exposure. “Mainstream foods and dietary supplements have got to be focus areas for producers of marine/algae-based ingredients,” says Marigot’s O’Leary. “So much opportunity exists, which with some innovation and product development focused on optimizing the critical areas of taste, color, and solubility, can achieve so much and present real alternatives for food companies that are actively looking to improve the nutritional impact of their finished food products.”

Marine ingredients can’t ignore the growing food and beverage market if they want to increase their exposure.

Aknowledgments

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Phospholipids are lipid molecules that are widely distributed in animals and plants and that make up the major constituents of cellular membranes. Part of what makes phospholipids unique is that they possess both hydrophilic and lipophilic properties. Forming the phospholipid bilayer of cell membranes, they exert influence on the types of molecules that can pass through the cell. These features also make phospholipids attractive as carriers for nutrients and chemicals.

Complexing molecules with phospholipids has been shown to increase the absorption and bioavailability of otherwise difficult-to-absorb compounds. These methods are commonly employed in drug delivery systems and are gaining recognition in the nutritional supplement space as well. Furthermore, certain phospholipids (including phosphatidylcholine and phosphatidylserine) may possess unique therapeutic benefits of their own.

In addition, naturally complexed sources of phospholipid-containing molecules (such as krill oil and eggs) have shown important health benefits. Summarized here are some recent investigations into nutritional applications of phospholipids and their complexes.

**Phospholipids Enhance Krill Oil Omega-3 Bioavailability**

Preliminary research indicates that omega-3 fatty acids in the form of krill oil may be more bioavailable than omega-3s from fish and possibly other sources. The omega-3s in krill are bound to phospholipids, while those in standard fish oils are generally not. It is thought that this difference is a major factor in increasing the uptake of fatty acids in krill into various tissues.

Vanu Ramprasath and colleagues from the University of Manitoba (Winnipeg, Canada) conducted a crossover trial in order to evaluate the effects of two different krill oil preparations, versus corn oil, on the bioavailability of omega-3 fatty acids EPA and DHA in plasma and in red blood cells in healthy volunteers. The study included 20 healthy adults who were asked to consume a low-phospholipid krill oil, a high-phospholipid krill oil, or corn oil daily, each for four weeks. Both krill oil preparations delivered 600 mg...
of total omega-3s daily, differing only in the amount of phospholipids.

At the end of the study, plasma changes in omega-3 parameters were observed to be similar between both krill oil preparations. However, consumption of the high-phospholipid krill oil preparation significantly increased red blood cell levels of EPA, the fatty acid DPA (an omega-3 fatty acid distinct from EPA and DHA), and total red blood cell omega-3 levels, compared with the low-phospholipid krill oil. This indicates that krill oils with higher phospholipid contents enhance the bioavailability and red blood cell uptake of omega-3 fatty acids to a greater extent than lower-phospholipid oils.

**Krill Oil for Knee Pain**

As mentioned, krill oil is a source of omega-3 oils that are naturally bound to phospholipids, which some researchers believe increases the absorption and bioavailability of the omega-3 fats. Krill oil–sourced omega-3s have been found to have beneficial effects in previous research on cardiovascular parameters, markers of inflammation, and osteoarthritis.

In a recent study, researchers from Junendo University (Inzai, Chiba, Japan) and the University of Michigan (Ann Arbor, MI) sought to evaluate the benefits of krill oil for mild knee pain in Japanese adults. Fifty adults complaining of knee pain were randomized to receive 2 g/day krill oil or a placebo for 30 days. Two subjective measures of joint function in the form of questionnaires were employed, including the Japanese Knee Osteoarthritis Measure (JKOM) and the Japanese Orthopedic Association (JOA) score.

While both the placebo and krill oil group showed improvements in the JKOM and JOA questionnaires after 30 days, knee pain and stiffness as assessed by JKOM improved more when administered as a phospholipid complex. The JKOM score improved 13.6 points in the krill oil group compared with low phospholipid krill oil.

**Phospholipid-Based Curcumin for Weight Loss**

Phospholipid complexes enhance the delivery of several compounds besides omega-3 fatty acids. The uptake of curcumin, a normally poorly bioavailable component of turmeric, has been shown to be substantially improved when administered as a phospholipid complex.

Francisco Di Pierro and colleagues from Italy recently conducted a study aiming to assess the ability of a highly bioavailable phospholipid-complexed curcumin to support weight loss in overweight individuals with metabolic syndrome.

The study began with 127 individuals who were placed on a 30-day dietary and lifestyle intervention for weight loss. Of the 127 individuals who began the study, 44 people showing a weight loss of less than 2% were selected for the second phase of the trial in which they were administered, for an additional 30 days, the phospholipid-curcumin complex—800 mg *Curcuma longa* extract (95% curcumin) complexed with sunflower phospholipids and blended with 8 mg piperine from black pepper/day—or pure phosphatidylserine (400 mg/day).

The curcumin group showed a weight loss of nearly 5%, a decrease in BMI of 0.43%, and a reduction of body fat of 8.43%. This compares to a weight reduction of only 1.88%, a body fat reduction of 0.70%, and a change in BMI of 2.10% following the 30-day lifestyle and diet intervention phase. The control group (phosphatidylserine only) did not show such effects. The results of this preliminary study show that a highly bioavailable form of curcumin can positively influence the ability to manage weight in overweight individuals.

**References**

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**Egg Phospholipids for Endothelial Health**

Eggs are a major dietary source of phospholipids in Western diets. Potential therapeutic benefits of phospholipids include anti-inflammatory effects and positive benefits for cholesterol metabolism.

Polish researchers recently investigated the effects of egg-derived phospholipids in patients with metabolic syndrome. The study included 40 adult non-diabetic individuals with metabolic syndrome who were divided into two groups: one group supplemented with olive oil (15 ml three times daily), while the other group took an egg phospholipid preparation in the same amount daily for one month.

Daytime systolic blood pressure improved in both groups at the end of the supplementation period. However, additional benefits were seen with the egg phospholipid preparation, including a decreased waist-to-hip ratio; decreased GGT (gamma-glutamyl transferase) levels, indicating improved liver function; decreased plasma platelet concentration, indicating improved circulatory function; and increased flow-mediated dilation, indicating improved endothelial function. Thus, supplementation with egg-derived phospholipids may be beneficial for enhancing several health parameters in adults with metabolic syndrome.
Scientific knowledge of omega-3 long-chain polyunsaturated fatty acids (omega-3 LCPUFA), obtained by observation and experimentation, has evolved tremendously over the past 10 years, with scientists eager to understand omega-3 LCPUFA—in particular, eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA). This fascination with omega-3 LCPUFA has led to the publication of more than 14,000 new studies during the period 2008–2017.

In this article (the first in a two-part series, with the second to be published in a subsequent issue), I will explore how our understanding of omega-3 LCPUFA has evolved over the past decade.

**Development**

Our understanding of the role of omega-3 LCPUFA in tissue development, particularly during gestation, has progressed in the past decade. Whereas in older studies, the role of omega-3 LCPUFA was primarily viewed as a structural component of cellular membranes (in particular given the high local concentrations in specific tissues such as brain and retina), new insight has been obtained that omega-3 LCPUFA are also important for the development of other tissues that are not characterized by extremely high levels of omega-3 LCPUFA, such as the hormone-producing alpha-cells and beta-cells in the pancreas, the development of the peripheral nervous system, and the lung.
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** Bohbot J. The Gynaecologist’s and Obstetrician’s Journal 2007. Special Issue from the CCD Laboratory.
These advances have implications for neonatal and infant health outcomes and the reasons for sufficient dietary omega-3 intake. Sufficient dietary intake of omega-3 LCPUFA during pregnancy has been shown to have numerous benefits, including a small but positive influence on gestational length, a marked reduction in the incidence of preterm birth (prior to 34 weeks gestation), and positive effects on maternal health. Interestingly, specific needs for both arachidonic acid (AA) and DHA in tissue development seem to happen during defined periods of fetal development, suggesting the need to guarantee dietary sufficiency of various specific PUFA in the feeding of neonates that have not yet completed their development, especially those born pre-term. Research is also addressing the possibility that perinatal epigenetic effects of omega-3 LCPUFA status are of relevance to infant development, with effects that may last into childhood and adulthood.

Omega-3s and Evolution

From a biological point of view, it has been demonstrated that the transfer of omega-3 LCPUFA from organisms that produce these fatty acids (marine algae and bacteria) upwards the food chain occurs at a higher efficiency than that of macronutrients. This suggests that animal species at all levels of the food chain can somehow sense the presence and levels of essential PUFA available in prey, and that acquisition of essential PUFA is very important for their survival.

In their evolution, hominins developed a layer of body fat during the third trimester of pregnancy that can store sufficient amounts of DHA to support a newborn’s development, and in particular its large brain. The very high demands for brain-selective nutrients such as DHA and AA by humans is quite unique among animal species, and evolutionary biologists have maintained a lively debate in the past few years about how this has come about. Well-argued theories now hold that the early human race has developed on the context of a regular access to foods containing a range of brain-selective minerals (iodine, iron, zinc, copper, and selenium) and PUFA, plentifully found at freshwater and marine shores.

Many people are not getting enough pre-formed DHA. Whereas alpha-linolenic acid (ALA) and linoleic acid (LA) are essential fatty acids for the biosynthesis of the omega-3 and omega-6 PUFA families, respectively, the direct ingestion of sufficient daily dietary doses of pre-formed DHA and AA may be a physiological necessity determined by our evolutionary history.

Modern Intake

The very different conditions in which most people today live their lives, compared to our hominin ancestors, may impede our ability to acquire the daily omega-3 LCPUFA intake that most people need. Recent epidemiological studies have indicated that a large part of the world population has low—and in a significant portion, abysmally low—daily intake of omega-3 LCPUFA. What’s more, low global...
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intakes of these fatty acids are associated with tens of millions of preventable deaths from non-communicable diseases every year.

Interestingly, on the backdrop of this awareness, molecular genetics is making incremental strides in demonstrating the enormous human ethnic variation in the essentiality of the omega-3 PUFA ALA. Some genetic polymorphisms that permit the efficient conversion of ALA in some traditionally vegetarian populations are nearly totally absent in other traditionally obligate carnivorous societies that obtain all of their EPA/DHA directly from dietary sources.

In genetically admixed populations (a major part of today’s societies), it is, without testing omega-3 fatty acid status, nearly impossible to say with certainty who will benefit from dietary intake of EPA/DHA and who will be healthy on a vegetarian diet. The situation is more complex in certain life stages where demand for specific fatty acids may be enhanced, such as for DHA and AA in pregnancy.

Genetic studies may ultimately lead to a redefinition of the essentiality of ALA, since ALA will not be essential for individuals unable to convert ALA; for these people, EPA and DHA intake are effectively essential. Ten years ago, the term “conditional essentiality” was coined, referring to specific life stages during which EPA/DHA would be essential, and the foundations of a molecular understanding supporting this term have certainly been advanced today.

A lot of the good news about omega-3 LCPUFA activity for the body may in fact be a reflection of restoring endogenous tissue levels that were poor from the beginning, whether determined in cells, experimental animals, or in human beings. How to best assess and address nutritional deficiencies that are global in nature, but with a marked inter-individual variation in genetic components and dietary habits, is a main line of evolution.

Studies indicate that a large part of the world population has low daily intake of omega-3 LCPUFA.
An Innovative Whole-Fruit Cucumber Extract, with Significant Nutritional Benefits for Muscle and Joint Health.
Omega-3 Challenges
The past few years have also seen a marked recognition of the challenges that nutritional scientists face in assigning biological activity to specific nutrients, as is the case for PUFA. In contrast to randomized controlled intervention studies of drugs, which function on a non-existing background of the test substance in the body and the diet, controlled trials with nutrients are extremely difficult to carry out.

In the case of omega-3 LCPUFA, the reasons for this have been reviewed, and limitations more clearly defined, allowing for a better understanding of how to carry out suitable intervention studies and avoid sub-optimal study designs. This includes measuring baseline omega-3 levels and actual absorption and distribution of dietary or supplemental fatty acids. Still, and likely to be seen repeated over the coming years, the understanding of the role of omega-3s in human health starts out with small studies that are frequently of observational nature and are gradually scaled to larger study groups to better control the host of variables that plague nutritional intervention studies.

In the Body
In the past 10 years, studies have been carried out to better characterize the distribution of omega-3 LCPUFA in the body. Once ingested, the fates of EPA and DHA are quite distinct, displaying different kinetics in the incorporation into different, but overlapping, pools of lipids in distinct cell types.

Detailed studies of tissue distribution in rats have confirmed that the distribution of individual PUFA species varies tremendously between tissues, with extremes for DHA levels being 78-fold higher in brain compared to adipose tissue, and for EPA being 780-fold higher in testes than in adipose tissue. Surprisingly, skeletal muscle may contain the largest pool of DHA.

Marked inter-individual differences in people have furthermore been documented in studies carried out in the past few years that aim to stratify people based on their omega-3 status.

Risk stratification based on PUFA membrane composition has become a very promising line of research for prediction of disease risk, especially with respect to non-communicable and lifestyle-related chronic illnesses that are afflicting billions of citizens today. On average, marked increases in blood levels of EPA and DHA can be achieved after several weeks of sustained daily intake. A period of three months of supplementation seems to be an acceptable period to adjust a low and insuf cient level to one corresponding to a level that is correlated with signifcant reduction in risk for chronic infl ammatory disease.

Testing for Fatty Acid Levels
Given large inter-individual responses to changes in omega-3 LCPUFA intake, the only way to confrm absorption and membrane incorporation (and compliance in case of intervention studies) is by testing actual fatty acid levels in the body. The approach that has
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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.

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been developed in recent years is by measuring the sum of EPA and DHA as percentage of fatty acids esterified in the red blood cell membrane phospholipids (or similar approaches). Interestingly, this “omega-3 index” shows good predictive value for high and low risk for a variety of disorders that afflict mankind, in particular those that have a chronic low-grade inflammatory component.

Several layers of regulation ultimately define tissue content of omega-3 LCPUFA. A few factors that have been shown to be important are the absolute amounts of daily ingested omega-3 LCPUFA, the efficiency of fat digestion, the regulatory feedback of highly unsaturated fatty acids on the enzymes that convert ALA into EPA and DHA, and the actual usage of omega-3 LCPUFA. The latter includes the non-enzymatic turnover of PUFA (for example by oxidation) and by enzymatic pathways (used for energy generation and conversion into lipid mediators after release from membrane phospholipids).

How the levels of EPA and DHA in distinct lipid pools relate to health and disease is still difficult to understand since the body is extremely complex and given the difficulty in taking samples from most organs to address this relationship in human intervention trials.

**The Modern Omega-3 Supply**

Relatively few food products contain substantial levels of omega-3 LCPUFA, nearly all originating from the marine food chain. Over the past 10 years, a wealth of knowledge has become available of the presence and capacity in many distinct organisms to biosynthesize EPA and DHA.

Ten years ago, the biotechnological application of using the bacterial polyketide synthase mode of producing EPA and DHA was developed. Now, the capacity to produce omega-3 LCPUFA has been expanded to higher plants, in which omega-3 LCPUFA, such as stearidonic acid and DHA, can be produced.

Land-based omega-3 LCPUFA production is a tremendous biotechnological accomplishment, completely changing the nature of evolutionary biology of humans from this decade into the far future. Critical in achieving this was the science in overcoming product-mediated inhibition of gene expression of the many heterologous expressed enzymes needed to reproduce a functional biosynthetic pathway for omega-3 LCPUFA production in higher plants, from which seed oils can be obtained at industrially relevant levels. If this can be accomplished, there is no end to imagining what science will be able to achieve in the next decade.

I regret that it has been impossible to highlight a more complete spectrum of scientific discoveries and advancements of the past 10 years. References that support the mentioned scientific developments can be obtained from the author via e-mail at gerard@goedomega3.com. More information on the role of polyunsaturated fatty acids in health can be found at Fats of Life (www.fatsofife.com).
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Source: AAM Digital Audit, June 2015
Agave in the Spotlight

Is agave syrup still a promising sweetener?

BY JENNIFER GREBOW, EDITOR-IN-CHIEF

Agave syrup has seen its ups and downs over the years. While the syrup, also marketed as ‘agave nectar,’ rose to popularity a decade ago as a sugar replacement, in recent years agave syrup has also come under fire from detractors concerned about the syrup’s high fructose content.

So, is this the end of the story for agave? Not according to the agave suppliers we spoke to, who say there are still many ways to take advantage of the benefits of agave syrup as a sweetener. Market researcher The Freedonia Group (Cleveland) also predicts continued growth for agave syrup. In its newly released report, “Alternative Sweeteners Market in the U.S., 9th Edition,” Freedonia forecasts that the agave market will still continue to grow through 2020, albeit at a slightly slower rate (3.9% CAGR) than in the past. Here’s a look at how companies are continuing to build excitement around agave.

Agave’s Benefits

Food and beverage formulators may find that agave’s sweetening properties outperform those of other syrups and natural sweeteners in some ways. ‘Agave syrup does not bring forth bitterness like stevia and has a greater Maillard reaction (browning effect) than tapioca or rice syrups,’ says Tonya Lofgren, marketing manager for organic-ingredients supplier Ciranda Inc. (Hudson, WI). ‘Outside of high-fructose corn syrup, agave syrup has the highest sweetening power when compared to tapioca, rice, or corn syrup. It delivers instant sweetness but typically does not affect the mouthfeel or juiciness of a product like tapioca syrup will.’

“We have found our greatest successes with beverages of all kinds, from carbonated to teas,” says Thom King, CEO and president of natural-sweeteners supplier Steviva Ingredients (Portland, OR).

According to Lofgren, due to its functional properties, agave syrup does not perform well as a sweetener in foods like hard candies or soft chews ‘where the crystallization process is necessary. Starch-based glucose syrups, such as tapioca, are the preferred choice for these applications.’

New Flavors

Agave syrup’s flavor is most often described as possessing a hint of caramel, which means it ‘pairs well with warmer flavors such as cardamom, cinnamon, ginger, nutmeg, almond, maple, anise, and cocoa,’ says King. ‘We have launched these flavors with quite amazing success. One of Steviva’s latest additions to its Nectevia agave nectar line is Nectevia Masala Chai Spice.

In addition to describing agave as neutral flavored, Claudia Cetto, administrative coordinator for agave-ingredients supplier The Iidea Company (Guadalajara, Mexico), says that agave syrup ‘emphasizes the natural flavor of food and drinks, whereas sugar might hide the natural flavor of food.’

Combination Sweeteners

Given concerns over agave’s high fructose content, agave’s greatest use today may be in combination with other natural sweeteners. King says that Steviva created Nectevia as a combination of agave and stevia as a way to address some of those concerns. ‘Agave is made of naturally occurring minerals, inulin, and fructose. Though fructose is low glycemic, doses over 25 g per day can increase blood lipid levels and triglycerides,’ King explains. ‘By adding stevia, we have increased the sweetness [of Nectevia] to over four times more than that of regular agave so the consumer uses 25% as much.’ As a result, he says, the total fructose content of Nectevia is under 3 g per serving, which he says will sweeten 16 oz of liquid. In this combination, agave itself also provides benefits—namely, helping to mask some of the off-notes of stevia.

Lofgren says agave syrup can also pair well and help to mask the off-notes of another high-intensity sweetener, monk fruit. She also suggests pairings with other syrup sweeteners. ‘Combining agave syrup with glucose syrups like rice or tapioca can provide a balance of sweetness and functionality, while giving greater control on shelf life, mouthfeel, sweetness, and texture, than any syrup can provide on its own.’

Cetto says that her company is able to not only combine agave syrup with other sweeteners but also with ingredients like fiber.

These types of alternatives highlight how agave can still play a role in the sweeteners market. Ultimately, consumers will decide how best to use agave. Lofgren says, ‘With high-fructose corn syrup’s bad rap, it’s natural that questions surface about any fructose syrup, but as with most everything in life, moderation is key.’

‘As the ‘natural’ sweetener market grows, agave syrup will continue to be explored as a viable option, especially when combined with other liquid sweeteners,’ she concludes.
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Sports Powders: STILL STRONG

A broadening customer base means new opportunities for sports powders, p. 10
GET BACK IN THE GYM

DigeZyme®, a multi-enzyme complex, incorporated with specific enzymes that are clinically proven to be helpful in supporting a healthy digestive system, has been recently evaluated for Delayed Onset Muscle Soreness (DOMS). The latest study from Sabinsa demonstrated statistically significant improvement in both subjective pain and muscle tenderness after eccentric exercise.* This study establishes the role of DigeZyme in sports nutrition, especially as a post exercise recovery supplement.† DigeZyme is available as a powdered blend which can be mixed with other sports nutrition ingredients and commercialized as a standalone product.‡


†Patent Pending

Discover more about this ingredient at www.digizyme.com. Use the QR code to download our latest white papers. Call us for more details: NJ: 732.777.1111 | UT: 801.465.8400

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Numbers Look Bright for Sports Nutrition

Sports nutrition sales estimates for 2016 are in, courtesy of *Nutrition Business Journal*. At a presentation at March’s Natural Products Expo West trade show titled “Supplements Today: Why the Future Looks Bright,” the publisher provided an in-depth look at 2016 sales figures for the U.S. dietary supplements industry.

Against the backdrop of a thriving supplements market overall, the U.S. sports nutrition category is sitting pretty as the area of second-highest growth, with 8.3% year-over-year growth in 2016 to $5.72 billion. Put in perspective, the only category showing more growth these days is probiotics (with 17.0% growth in 2016).

The growth in sports nutrition is even outpacing the impressive growth of the overall supplements market, which in 2016 grew at 6.6% (compared to sports nutrition’s higher pressive growth of the overall supplements market, which with 17.0% growth in 2016).

The growth in sports nutrition is even outpacing the impressive growth of the overall supplements market, which in 2016 grew at 6.6% (compared to sports nutrition’s higher 8.3%).

According to *Nutrition Business Journal*, key growth drivers for the U.S. sports nutrition industry are 1) a shift of the market toward everyday consumers, 2) an increased focus on active lifestyles, 3) an evolving product mix, and 4) expanding distribution channels.

Broadening usage is a main focus of sports nutrition these days, whether by addressing a wider range of consumers, pointing out how active living applies to customers of all types, and expanding distribution channels and product types. All of these tactics are yielding dividends—something that we touch on in our sports powders feature starting on page 10. It’s against this positive backdrop that sports nutrition marketers are finding their next opportunities and success.

Jennifer Grebow
Editor-in-Chief
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NPA Announces New Partnership to Test Sports Supplements

The Natural Products Association (NPA; Washington, DC) has entered into a partnership with Informed-Choice, an international testing program for sports-nutrition products. Together, NPA and Informed-Choice plan to expand access to testing of dietary supplements for sports, and minimize the risk of supplement contamination with banned substances identified by the World Anti-Doping Agency.

"Athletes deserve to know the supplements they are using contain only those ingredients listed on the label," says Daniel Fabricant, PhD, CEO and executive director of NPA. "Anyone who wants to know if a product is approved for use in sport will simply look for the Informed-Choice logo. Not only will NPA's partnership with Informed-Choice increase athlete and consumer confidence, it will also raise retailer and supplier confidence."

Informed-Choice was first set up in 2007 as a program to certify manufacturing facilities, finished products, and raw materials as being free of banned substances. It is administered by LGC (Lexington, KY). To be certified as an Informed-Choice Certified Site, manufacturers must undergo a rigorous audit of their production processes, including a site visit and assessment of 20 swab samples. With the new partnership, Informed-Choice and NPA expect to increase the number of Informed-Choice Certified Sites across the country and be better positioned to protect consumers from adulterated products for sports nutrition.

"Informed-Choice is designed to minimize the risk of contamination, and the partnership with NPA will help introduce the program to even more manufacturers, which can only be a good thing for the supplements industry in the U.S.," says Paul Klinger, business development manager for Informed-Choice in the US.

NPA members will also be given preferential access for their facilities to become Certified Sites as a result of the partnership. Fabricant adds that "NPA had the first and oldest GMP certification program with third-party auditor Underwriters Laboratories (UL; Northbrook, IL); the addition of Informed-Choice certification now gives our members a one-stop shop for all of their certification needs."

CRN Challenges Ban on Creatine Sales to Minors

In February, the Honorable Linda Rosenthal, assemblywoman in the New York State Assembly, introduced a bill (AB 4712) that would prohibit the sale or distribution of the dietary-supplement ingredient creatine to minors. Rosenthal's bill follows years of legislation from a report created several years ago by New Jersey's Governor's Task Force on Steroid Use and Prevention. That report suggested links between creatine use and kidney damage, but Lebert challenged the validity of those conclusions.

"This assertion is based on a total of two published case reports in which the affected individuals were suffering from existing underlying renal disease," Lebert wrote. She added that, "In fact, other, more reliable (i.e., double-blind, randomized, controlled intervention) studies demonstrate the safety of long-term creatine use in both healthy individuals and clinical populations, specifically as it relates to renal function. In consideration of this, there is no conclusive evidence whatsoever to support the notion that creatine use may adversely affect kidney function in healthy individuals."

To the contrary, Lebert pointed out, the "overwhelming majority" of trials published on creatine have had positive outcomes, with a "general consensus showing the safe and beneficial effects from creatine supplementation, particularly during short, repeated bursts of high-intensity activity." The European Food Safety Authority (EFSA) and the International Society of Sports Nutrition (ISSNN) have both affirmed the overall safety and efficacy of creatine supplements, Lebert explained, in 2004 and 2007, respectively. Creatine can also be readily found in the food supply, including in red meat, fish, and poultry, and it is a "naturally occurring amino acid–like compound made in the liver," the letter noted.
† Results compared to baseline


5. Kalman D, Perez Ojalvo S, Komorowski J. Comparison of cellular nitric oxide production from various sports nutrition ingredients. J Int Soc Sports Nutr. 2016;13 (Suppl 1):P33. ©2017 Nutrition 21, LLC Nitrosigine® is a registered trademark of Nutrition 21, LLC. Nitrosigine is protected by a number of patents and pending patent applications on compositions, their manufacture, and/or their uses, including, but not limited to: U.S. Patent Nos.: 5,707,970; 6,156,735; 6,344,444; 6,803,456; 7,576,132. DRA951032317

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Nitrosigine vs. Other ingredients: In Vitro Study ‡

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*P<0.01 vs. other ingredients

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1 Results compared to baseline
6 Kalman D, Perez Ojalvo S, Komorowski J. Comparison of cellular nitric oxide production from various sports nutrition ingredients. J Int Soc Sports Nutr. 2016;13 (Suppl 1):P33. ©2017 Nutrition 21, LLC Nitrosigine® is a registered trademark of Nutrition 21, LLC. Nitrosigine is protected by a number of patents and pending patent applications on compositions, their manufacture, and/or their uses, including, but not limited to: U.S. Patent Nos.: 5,707,970; 6,156,735; 6,344,444; 6,803,456; and 7,576,132. DRA951032317

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Lebert also suggested that any effort to place mandatory age restrictions on the sale of creatine supplements may force many retailers to stop selling such products altogether, which would make it more difficult for even consumers of legal age to purchase creatine supplements.

Even before Rosenthal’s bill, creatine had already made headlines in 2017 after a study published in Pediatrics suggested that employees of U.S. health food stores were largely willing to recommend teenage boys take creatine supplements. The study involved a 20-year-old male researcher who posed as a 15-year-old football player and contacted 244 health food stores by phone to see if sales attendants would recommend he take creatine or a testosterone-boosting supplement. The study found that 67.2% of the attendants did recommend the 15-year-old boy take creatine, while 30.3% recommended against him taking creatine, and 2.5% refused to make a recommendation over the phone.

**Metabolic Technologies Promotes Vitamin D3, HMB Combination for Sports Market**

Metabolic Technologies Inc. (MTI; Ames, IA) has debuted a new website for its MyoeDge formula, a combination of vitamin D3 and calcium beta-hydroxy-beta-methylbutyrate (HMB) that it is promoting in the sports-nutrition market. The newly launched site includes ingredient details, research data, and licensing information for MyoeDge.

MTI explains that while HMB supplementation has been relatively well-researched for offering improvements in lean muscle mass, strength gains, and recovery combined with intense training, the benefits of combining it with vitamin D3 have only become apparent recently. The new website is designed to explain the benefits of the combination.

For instance, results of a 2016 prospective study published on the site suggests elderly women who supplemented with HMB, protein, and vitamin D3 experienced significant increases in strength while recovering from orthopedic surgery for hip fracture.

“The goal of the MyoeDge website is to provide vital information to consumers regarding the ingredients comprising MyoeDge and the science behind those ingredients,” MTI explained, in the website announcement. “Consumers can then make an informed decision about their nutritional supplement regimen.” The website can be found at www.myoedge.com.
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The growth of the sports supplement industry as a whole is giving professional, semi-pro, and casual athletes a greater array of options for supporting their performance—and market experts say that this is good news for manufacturers and marketers of sports powders especially. More competition may not appear to be a positive, but according to these experts, alternative supplement formats like bars and tablets present a variety of issues that will ensure powders’ dominance in the market.

These experts also warn, however, that successfully taking advantage of the expected resurgence of powders will require new strategies to target a new generation of powder buyers. No longer content to simply use protein powders for muscle bulk, today’s sports powder users are looking for increasingly specialized products with ingredients custom-tailored to their specific needs.

Growing Market
Matthew Oster (Chicago, IL) is a research analyst at Euromonitor International, a global market research firm that tracks nutrition industry trends. Oster says that according to Euromonitor data, the powder market is still growing quite rapidly, especially in the United States and Western Europe. Oster expects the powder market to expand beyond its core user base.

“In a lot of places, the core user demographic is expanding,” Oster says. “There aren’t many consumer goods that have a 30-year history like sports powders do that are still growing at a fast pace. Even if you think of sports powders as a niche product with a growth ceiling, the market is still growing quite rapidly—which is atypical for consumer goods.”

Euromonitor’s research indicates that the American sports powder market—worth approximately $5.6 billion in 2014—is expected to see 9% annual growth between 2013–2018. And while ready-to-drink sports supplements are seeing fast adoption, Euromonitor data indicate that powders remain (and
A Long History of Powders

While modern sports powders were first invented in the 1950s, they have an ancient precursor that dates all the way back to the classical era. One of the earliest references to a powder-like sports supplement is found in the writings of Roman philosopher Pliny the Elder (AD 23–AD 79). In Natural History, Book XXXVI, Pliny the Elder quotes scholar Marcus Varro as saying, “Your hearth should be your medicine chest. Drink lye made from its ashes…gladiators after a combat are helped by drinking this.”

Sports Powders Still Best Delivery Format

What makes powders so great? Debasis Bagchi, PhD, is a professor in the Department of Pharmacological and Pharmaceutical Sciences as the University of Houston (Houston, TX) and the chief scientific officer at ingredients supplier Cepham Inc. (Piscataway, NJ). A former president of the American College of Nutrition, Bagchi has participated in the development of a variety of sports nutrition formulations involving amino acids and whey proteins. Bagchi points to one big benefit of powders over other delivery formats when formulating supplements—namely, that powders are stable.

While the ingredients used in ready-to-drink supplements tend to degrade over time, Bagchi says, powders maintain their integrity very well. Bagchi also points to a variety of problems with other formats as factors that will ensure powders remain popular.

“A lot of companies have crowded the market on bars,” Bagchi says, “but bars are loaded with sugar. Tablets are the same; they use sugar to bind ingredients. Tablets and bars have lots of additives. But powders have only the core constituents and very few additives.”

Elyse Lovett, marketing manager at ingredients firm Kyowa Hakko (New York City, NY), points to another characteristic of powders that ensures their supremacy over other formats. Says Lovett: “You can get more ingredients into a powder, and in higher concentrations, than you can into a bar, capsule, or pill. The powder takes a bit more effort to prepare, but it’s worth it. Powders are also a great way to stay hydrated when you dissolve them in drinks.”

Joe Weiss, president of ingredients firm Nutrition 21 LLC (Purchase, NY), details other practical benefits of powders for the consumer—namely, that “they are flexible in that users can create their own custom...
blends to support their exercise, fitness, or bodybuilding regimen.” And for manufacturers? “Powders have an advantage over RTDs [ready-to-drink beverages] in that the cost of shipping water isn’t a factor for manufacturers,” he says.

Emerging Niches Provide New Opportunities for Sports Powders
A renewed interest in health and fitness—and a continually diversifying array of products—is expected to give sports powder manufacturers a variety of new avenues for targeting powder users in ways that weren’t previously possible. Market segmentation means that powder consumers can benefit from new powders that appeal to specific demographics and meet specific needs.

Lovett says that one growing niche is brain health. Powder users are looking for a mental edge, she says, one that boosts focus and improves reaction time.

“[The opportunities in brain health] could be anything from college sports all the way up to professional leagues,” Lovett notes. “Think about Olympic athletes. Even the second-place athletes are just seconds away from winning. Even a one-second decrease in reaction time could mean the difference between first and third place, and when you look at the research on brain health, a lot of the brain health ingredients in powders are showing a positive impact on sports performance.” This includes Kyowa Hakko’s own Cognizin citicoline ingredient, which has been clinically shown to support mental energy, focus, attention, and recall.

Another example? Researchers recently found that Nutrition 21’s Nitrosigine ingredient, an inositol-stabilized arginine silicate, improved cognitive performance in healthy, exercising adult men. Subjects supplementing with Nitrosigine performed better in neurophysical tests involving visual attention and task switching. “The study showed a 33% increase in cognitive acuity, including processing speed and executive functioning,” Weiss explains. “This makes Nitrosigine unique in the sports nutrition space by providing non-stimulant energy in pre-workout products as well as helping athletes improve their ability to focus.”

Other emerging niches include products aimed at seniors and women. Oster says that emerging trends suggest an increasing need for muscle-building powders marketed toward women. Marketing muscle-building powders toward women, however, will require a unique approach, he says.

Says Oster: “When you attract women who are involved in weight training, you can’t market the powder as a muscle-building product. You want to market it as a lean or diet powder. The gap in the market is for a lean product—a powder that’s formulated and positioned around building lean muscle and supporting general health.”

It also appears that a new opportunity in the 55-plus age demographic is on the horizon, as evidenced by the European Food Safety Authority’s February 2016 approval of a health claim for creatine and muscle strength for people over the age of 55. “Taking advantage of this opportunity, however, will require a creative strategy and new product positioning.

Lovett says that sports powders marketed toward seniors should have health claims written in common terms, with an emphasis on health maintenance rather than muscle building.

Oster agrees, noting that educating the market will be a key strategy. Says Oster: “Seniors tend to be active supplement users, so it’s not a matter of convincing them to supplement their nutrition. It’s more about getting them to understand what the supplement is doing for them.”

Oster suggests that a successful sports powder marketed toward active seniors would likely position itself around supporting heart and bone health, improving endurance, and maintaining a high quality of life.

“When you start to expand your positioning,” Oster says, “you start to compete with the whole market of products that are positioned for elderly consumers. There’s a balance to be struck between the sports angle and the seniors angle.”

Changing Markets Require a New Approach
Oster has illustrated one of the main challenges facing the powder market: advertising.

While sports powders’ user base has broadened to include casual athletes, the changing market demographics indicate that product positioning will require manufacturers and brand consultants to strike a delicate balance in the types of claims they make.

“Casual users are fundamentally most interested in health-and-wellness claims rather than sports nutrition claims,” Oster says. “A lot of these casual athletes are focused on broader claims like ‘non-GMO’ and organic.” Powders are stereotypically associated with bodybuilders, which is an optics problem that needs to be straightened out.

Oster says that product positioning is starting to change, and with the new challenge of attracting as broad a user base as possible, more widespread adoption is happening in fits and starts. Oster points to the proliferation of new market segments as an opportunity for growth. Expanding beyond core powder users, he says, will mean appealing to adherents of the paleo movement, as well as vegans. Nutrition 21’s Weiss points out that when it comes to plant-protein powders, “Recently, these products have been dramatically improved from a taste and mouthfeel standpoint, which has helped them become more mainstream.”

But Paleo dieters may also view vegan options as inferior to animal or dairy proteins,
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Oster notes, which is why beef protein powders are gaining popularity. The common thread running between the two trends, he says, is a clean-label approach.

Bagchi agrees. “People are getting more careful with what they put in their bodies. There’s a lot of research in the public domain to show how ingredients and products are performing.”

**Safety First**

Certification and research are also important, Bagchi adds. A growing demand for certification is expected to benefit the sports powder industry by providing easier access to a more mainstream consumer base and rout low-quality products from the industry. Oster says that a certification program for sports powders will allay consumers’ fears and expand powders out of the niche market and into the mainstream.

Says Oster: “There’s still this reluctance on the part of consumers. They want to know what they’re putting in their bodies. There’s all this news about dimethylamylamine (DMAA) coming out, news about questionable formulations and adulteration of products, powders started outside any kind of regulatory apparatus. A certification procedure will only help to allow for greater adoption among mainstream consumers.”

**Looking Forward**

The best strategy for capitalizing on the resurgence of sports powders, these experts agree, is threefold: Narrower target audiences with specialized marketing claims, clean-label practices that encourage transparency around formulations and ingredients, and a greater variety of formulations that can appeal to specific market segments like paleo dieters and vegans.

When striving to take advantage of a rapidly expanding market, it seems that the tried-and-true, honest approach works best: Sell your audience on the benefits that they want, and then give them the high-quality product that they need.

**References**


**Mike Straus** is a freelance journalist living in Kelowna, Canada. He has written for publications including Canadian Chiropractor Magazine, UX Booth, and Iconic Concierge Vancouver.
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Source: AAM Digital Audit, June 2015
Adulterants

ADULTERATION TODAY

Experts discuss emerging adulterants, strategies for catching adulteration, and whether the Designer Anabolic Steroid Control Act has made a difference.

BY JENNIFER GREBOW, EDITOR-IN-CHIEF

Adulterated products masked as dietary supplements continue to be a concern for professional athletes and weekend warriors alike. Nutritional Outlook caught up with two experts on the topic of adulterated sports supplements.

John Travis is a senior scientist at NSF International (Ann Arbor, MI). Travis has more than 20 years of experience as an analytical chemist specializing in the analysis of dietary supplements. As senior research scientist at global public health organization NSF International, Travis analyzes hundreds of dietary supplement products each year for various contaminants, emerging drugs, and harmful compounds. He has written articles for Nutritional Outlook on emerging adulterants in sports supplements and the tools used to detect them.

Amy Eichner, PhD, is a special advisor, drug reference and supplements, for the U.S. Anti-Doping Agency (USADA; Colorado Springs, CO). Eichner has worked with USADA in its Drug Reference Department since 2009 on initiatives such as USADA’s Drug Reference Hotline, the Global Drug Reference Online database, USADA’s Therapeutic Use Exemptions, and Supplement411.org.
Overall, how has the problem of sports-supplement adulteration improved since the passage of the Designer Anabolic Steroid Control Act of 2014 (DASCA)? What are some of the biggest problem areas that remain?

John Travis: NSF International has seen improvement in the issue of adulterated sport supplements since the passage of DASCA, which has definitely had a huge impact on this problem. Before DASCA, supplements containing steroids either directly by name or hidden on the label masquerading as another ingredient were marketed through blogs and forums. This type of distribution has pretty much disappeared. While there are still some companies out there selling steroids masquerading as supplements, many of the companies engaged in that practice have exited the marketplace. Hopefully, we do not witness a re-emergence.

Amy Eichner: The 2014 amendment to the Controlled Substances Act specifically named many anabolic agents that are considered “controlled,” which provided much needed clarity to enforcement agencies and manufacturers. Since then, we’ve seen a movement toward the sale of selective androgen receptor modulators (SARMs) and other experimental drugs, including Enobosarm, various peptide hormones, and other metabolic agents, that are not specifically named in any regulation. While USADA is not aware of any basis upon which companies can claim such substances are dietary ingredients, this doesn’t stop companies from advertising them as such. Consequently, athletes continue to be exposed to and test positive from illegal ingredients that can be dangerous and are prohibited in sport.

What are some of the most concerning adulterants now appearing in products marketed as dietary supplements for athletes? Why do you find these ingredients to be so troubling?

Eichner: Of greatest concern are the experimental drugs currently undergoing clinical trials, such as Enobosarm (also known as ostarine), ibutamoren, and others. These substances are investigational new drugs that act on the hormone systems in the body and have nothing to do with nutrition. The FDA has clarified that such products are not legitimate dietary ingredients, but they continue to pop up in dietary supplements.
Such ingredients in products marketed as dietary supplements pose a serious threat to athletes and all consumers.

Other ingredients that we see a lot and are concerned about include higenamine, methylsynephrine (oxilofrine), B-methylphenethylamine, and dimethylbutylamine (DMBA). We still even see methylhexanamine (DMAA) included in products, even though the FDA clarified years ago that methylhexanamine does not meet the definition of a dietary ingredient.

Travis: There are a set of concerning ingredients that are appearing in products which produce effects similar to the anabolic steroid products that we have seen in the past. Manufacturers of these products are targeting athletes and image-conscious people. The ingredients SARMs and GHRPs (growth hormone releasing peptides) have become more popular after the passage of DASCA.

SARMs and GHRPs are actually pharmaceuticals masquerading as supplements. Both SARMs and GHRPs have been on the World Anti-Doping Agency (WADA) prohibited list for some time. Researchers are investigating the clinical use of SARMs in hospitals for patients who lose muscle mass due to bed confinement for extended periods and the use of GHRPs in children with growth hormone deficiency. SARMs target the androgen receptor similar to anabolic steroids, while GHRPs target the ghrelin receptor, causing the cascade of events which stimulates the body to release more growth hormone. They have different, perhaps complementary, mechanisms of action within the body.

These are not legal dietary supplement ingredients. We are concerned that the side effects of supplements containing SARMs and GHRPs are unknown and that their use in healthy individuals has not been clinically investigated. During the clinical trial phase of many pharmaceuticals, the drug has been discontinued due to unacceptable side effects. It would be unfortunate to have an outbreak of serious adverse side effects due to the use of SARMs and GHRPs in dietary supplements.

As many problematic adulterants masquerade under false names on product labels, what are the best strategies to test for these substances?

Travis: Research conducted by NSF International has shown that some supplements in the market can contain harmful ingredients and contaminants, and they are not always listed on the label. Some of these harmful ingredients have actually not been proven safe for human consumption. In addition to the GHRPs and SARMs, our studies (with other researchers) have found that new stimulant drugs continue to appear on labels as botanical names, such as “geranium oil” for DMAA, “dendrobium extract” for DEPEA (N,alpha-dimethylphenethylamine), “Pouchong tea extract” for DMBA, and now “Acacia rigidula” as BMPEA (beta-methylphenethylamine). This gives people the false impression that the ingredient is derived from plants. This is fraud, plain and simple; these are all man-made chemicals. NSF International uses state-of-the-art analytical instrumentation and highly skilled analytical chemists to test for these substances in supplements. It is not a trivial task.

This is why NSF International developed a product certification program which tests dietary supplements to confirm what’s on the label is in the product and that the contents are not harmful to the consumer. Consumers should look for certified products that have been tested to ensure that there are no harmful contaminants or pharmaceuticals such as DMAA, DEPEA, DMBA, BMPEA, SARMs, and GHRPs that can harm people’s health.

Eichner: We all know that you can’t test quality into a product and that quality (including freedom from adulterants) must be designed into a product from day one. Supplement manufacturers are hopefully extremely careful about the raw ingredients they accept, and they should stay tuned to Supplement-411.org and Prohibited List changes to stay updated on ingredients that are prohibited in sport. Chances are if an ingredient is prohibited in sport, it has dubious nutritional benefits and probably does not belong in a supplement to being with.

What new steps do you think government regulators need to take to further prevent adulteration of supplement products for athletes?

Eichner: USADA continues to advocate for stronger regulations, as the current regulations do little to dissuade companies from manufacturing with ingredients that are illegal or downright dangerous. At this point, USADA is encouraging regulators to more effectively prevent the manufacturing or importation of investigational drugs.

Travis: I don’t think we will see an increase in government regulations, but we are seeing the dietary supplement industry becoming less concerned about calling out bad supplement manufacturers. This action creates more separation between the good and bad players in the industry. The shift is good for the industry, as they are taking responsibility for ensuring the supplements they produce are safer through certification. The NFL, NHL, MLB, PGA, LPGA, Canadian Center for Ethics in Sport (CCES), and the New York City Police Department all require the use of NSF Certified for Sport dietary supplements, which can be accessed through the NSF Certified for Sport app. This app lists all certified dietary supplements for products that have been tested on a lot-by-lot basis and are free of prohibited substances such as steroids, pharmaceuticals, as well as over 265 athletic banned substances from the WADA, NSF Annex B, NFL, and MLB prohibited-substance lists.
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.

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Sports Drinks

Trends in 2017

Market researcher Mintel and beverage specialist Flavorman talk about the evolution of sports drinks.

By Mike Strauss

What we consider a “sports nutrition drink” today might be changing. Recent data from Mintel (London, UK) suggests that traditional “sports drinks,” while still the dominant health drink in terms of total U.S. retail sales, are losing market share—7.5% loss in market share between 2010 and 2015, to be exact. Experts say this market decline isn’t indicative of a struggling industry, however, but rather an industry undergoing a metamorphosis, because declining sales in sports drinks are being offset by growing sales in functional drinks.

What is a functional drink? Functional drinks provide health benefits that go beyond basic nutrition. These benefits may include benefits for athletes, but they may also include benefits such as energy, for instance. In fact, if you scan today’s beverage shelves, you’ll see that sports drinks are no longer simply electrolytes and sugar dissolved in water. Today’s sports drinks are more advanced and specialized than ever before, with new formulations emerging to meet changing consumer demands.

As the market evolves, new formulations and advertising strategies will be required to effectively reach sports drinks users. Here are just five of the current market trends happening in the sports drinks space.

**Natural Ingredients and Colors Becoming Mainstream**

One of the most significant changes happening in the sports drinks space is the substitution of artificial compounds for healthier natural alternatives. Kristen Wemer, lab manager and senior product development specialist at beverage development company Flavorman (Louisville, KY), says more sports beverage manufacturers are now looking to make inroads in the natural space. “There’s a big push toward natural ingredients,” Wemer notes. “Some people are trying to remove sugar and replace it with natural sweeteners, while others are using natural colors. Some people are trying to use juices instead of adding vitamins and minerals.”

Wemer notes that traditional sports drinks will likely invest in more specialized offerings like low-sugar drinks, as manufacturers strive to offer low-sugar alternatives. The challenge, Wemer notes, is in making sports drinks both healthy and tasty.

**RTDs Going Strong**

In Wemer’s opinion, while powdered sports drinks have their audience, ready-to-drink (RTD) sports beverages are set to enjoy much more popularity. “Ready-to-drink is much more popular because it’s more convenient. The powder is definitely popular among hikers, campers,
and ultramarathoners who need something light and convenient, but the majority market is RTDs, and I don’t see that changing."

**Dairy Protein Remains Dominant, but Plant Protein Advances**

Incorporating protein into sports drinks is still common practice in the industry, but manufacturers are beginning to change formulations and are eyeing plant proteins for specific purposes. As such, Wemer says, while dairy proteins, specifically whey protein, are maintaining their dominance in the market, more opportunities are emerging for plant protein-based drinks.

However, Wemer adds, “Whey is very easy to work with from a technical standpoint. Dairy protein is more soluble than plant protein. You can use dairy protein in a Gatorade-type drink without giving it a creamy texture. Plant proteins are becoming more popular, but they’re harder to work with—they’re better for creamy post-workout drinks.”

**Sports Drinks Category Broadens to Include Functional Drinks**

While past sports drinks have focused on improving sports performance—with a specific emphasis on electrolytes—industry research shows that the sports drinks market is expanding to include products that have traditionally been considered functional beverages. A 2016 report by research firm MyDrink Beverages (Kaunas, Lithuania) has found that the definition of “sports drink” has expanded.

“Sports drinks are becoming multifunctional, incorporating rehydration, nutrition, and recovery to benefit the body before, during, or after sports,” Juste Akmenskyte, partner marketing consultant at MyDrink Beverages, said in a press release.

Wemer agrees that the boundaries of the sports drinks category are changing. “The lines are getting blurred with respect to what’s a sports drink and what’s a functional drink,” Wemer says. “We’re seeing similar ingredient lists—simple carbohydrates, and maybe just sodium as the electrolyte.”

**Thermogenic Drinks Gaining Ground, but Face an Uphill Battle**

Weight loss still remains a priority among sports drinks users, but experts say thermogenic sports drinks are seeing only minor growth. Wemer notes that many of the ingredients typically used in thermogenic drinks are impractical for a variety of reasons.

According to Wemer, “A lot of thermogenic ingredients are expensive, or they don’t work well in a liquid format, or they don’t taste very good.” Wemer also points to thermogenic ingredients’ short shelf life as another limitation. Most liquid-soluble thermogenics simply don’t store well, she says, which is problematic when using them in a beverage.

**Specialization Will Drive Future Market Growth**

MyDrink Beverages’ 2016 report studied the recent brand launches of 10 sports drinks and found that the most successful drink launches were those that had a specific target audience. Wemer agrees, pointing to the proliferation of new niches as opportunities for sports drink manufacturers.

Says Wemer: “In the next six months, the market is going to get much more specialized—more niche drinks for different types of consumers. We’ve seen some sports drinks with a target market in e-sports, for instance.”

**A Diversifying Market Demands a New Approach**

Industry data show that the sports drinks niche isn’t shrinking, but rather, changing. With a growing demand for natural and multifunctional drinks, new formulations will be required to meet the needs of specific demographic segments. Combined with an effective marketing strategy, manufacturers and distributors can maintain a competitive edge by producing natural, low-sugar sports drinks with a clear niche in mind. 

Mike Straus is a freelance journalist living in Kelowna, BC, Canada. He has written for publications including Canadian Chiropractor Magazine, UX Booth, and Iconic Concierge Vancouver.
Collagen Peptides Reduce Knee Discomfort in Athletes, Study Suggests


Researchers in Germany have published new study results suggesting collagen peptides may help reduce discomfort in athletes with functional knee problems. Subjects consuming the bioactive collagen peptides demonstrated statistically significant improvements in activity-related pain intensity, as well as reduction in the use of additional treatment options.

Writing in Applied Physiology, Nutrition, and Metabolism, researchers studied 139 adult athletes who consumed either 5 g of collagen peptides or a placebo per day for 12 weeks. Researchers assessed the effect of the supplementation by measuring change in pain intensity during activity using a visual analogue scale, as well as pain intensity under resting conditions, range of motion (ROM) of the knee joint, and use of additional therapeutic options.

Statistically significant changes were observed in the collagen group for improvements to activity-related pain intensity and reductions in the use of additional therapeutic treatment options, compared to the placebo group. Pain under resting conditions also improved in the experimental group, although the effect was not significant compared to placebo. No significant changes to joint mobility were found.

“The study demonstrated that the supplementation of specific collagen peptides in young adults with functional knee problems led to a statistically significant improvement of activity-related joint paint,” researchers concluded.

Arjuna Bark Extract May Support Heart Performance in Athletes


Arjuna (Terminalia arjuna) has revealed its potential benefits for use in heart-health supplements in past research, but a new clinical study now finds arjuna bark extract may support heart safety and performance in athletes. Prinova USA (Carol Stream, IL) recently shared the study results, which suggest Oxyjun, a proprietary arjuna bark extract developed by Enovate Biolife Pvt. Ltd. (Wilmington, DE), increased cardiovascular efficiency and improved cardiac conditioning in young men.

The double-blind, placebo-controlled, parallel-group study included 32 healthy men aged 18-40 who performed regular endurance exercise. For 56 days, subjects were randomized to receive either 400 mg/day of Oxyjun or a placebo. On the first day of the study, day 28, and day 56, subjects participated in an exercise protocol consisting of a treadmill run with a one-minute warm-up at 3 mph, followed by 2% increases in gradient and 1-mph increases in speed every three minutes, until the subjects said the exercise was too difficult to continue.

Also at each exercise session, researchers recorded participant heart rate and blood pressure, and assessed Borg Rated Perceived Exertion using the Borg Scale. They also collected venous blood samples within five minutes of exercise to measure cardiac biomarkers creatine kinase isoenzyme (CK-MB) and cardiac troponin-T. Additionally, researchers recorded left ventricular ejection fraction (LVEF) via electrocardiogram, as well as left and right ventricular myocardial performance index (MPI).

Compared to the placebo group, researchers found that the Oxyjun group showed significant improvements in LVEF and decreased right ventricular MPI after 56 days of supplementation. Furthermore, the fatigue level after completion of exercise, as captured by the Borg Scale, showed a greater decrease in the Oxyjun group compared to the placebo group. However, CK-MB and troponin-T did not change significantly.

“Based on the findings of the study, we deduce that [Oxyjun] improved various central factors for physical endurance such as left ventricular ejection fraction, time to exhaustion, and Borg RPE score,” said Robert N. Girandola, EdD, lead author of the study. “This study successfully demonstrates the extract’s ability to enhance the performance and protect the heart in young exercising adults.”

Oxyjun is an arjuna extract standardized for polyphenol and glycoside content. It is developed by Enovate Biolife, supplied by IN Ingredients (Columbia, TN), and distributed in North America exclusively by Prinova.

ATP Supplementation Prevents Post-Exercise Drop in ATP, Study Suggests

Purpara M et al., “Oral adenosine-5’-triphosphate (ATP) administration increases postexercise ATP levels, muscle excitability, and athletic performance following a repeated sprint bout,” Journal of the American College of Nutrition. Published online January 12, 2017.

There’s now one more piece of research supporting the exercise-recovery potential of ATP (adenosine-5’-triphosphate), as TSI USA Inc. (Missoula, MT) has announced promising new study results supporting its Peak ATP ingredient. Writing in the Journal of the American College of Nutrition, researchers found that ATP supplementation prevents exercise-induced declines in ATP levels, and
A recent study confirmed that ATP supplementation helped to prevent exercise-induced declines in ATP levels.

Enhances peak power and muscular excitability, also known as the ratio of power output to muscle activation.

The double-blind, placebo-controlled study included 42 healthy men aged 18–30 who were randomized to consume either 400 mg of Peak ATP or a placebo for two weeks. At the end of the supplementation period, subjects participated in an intense exercise bout that consisted of high-intensity sprinting. Researchers measured muscle activation and excitability during the exercise bout, as well as peak power with the Wingate test. ATP and related metabolites were also measured at baseline, at the end of the two-week supplementation period, and immediately following the exercise.

Researchers found that ATP supplementation appeared to prevent post-exercise drops in ATP, adenosine-5'-diphosphosphate (ADP), and adenosine-5'-monophosphate (AMP). No effect was found on muscle activation, but ATP supplementation was also found to significantly increase Wingate peak power in later exercise bouts compared to baseline. What's more, while the placebo group showed a significant decrease in muscle excitability in later exercise bouts, no such decline was observed in the ATP group.

“Oral ATP administration prevents exercise-induced declines in ATP and its metabolite, and enhances peak power and muscular excitability, which may be beneficial for sports requiring repeated high-intensity sprinting bouts,” researchers concluded.

TSI USA, in its study announcement, noted that the new study builds upon other research finding Peak ATP may help reduce post-workout muscle fatigue.

“Peak ATP is the only ingredient we know of that is proven to boost muscular excitability, a new and exciting category in sports nutrition,” said Larry Kolb, president of TSI USA. “By boosting muscular excitability, Peak ATP provides a critical advantage to athletes who want to increase the intensity and/or frequency of their workouts, and ultimately see better results from their efforts. Instead of fatiguing, athletes are able to push themselves harder because they are able to maintain muscle contractions during high-intensity workouts.”

OptiMSM May Support Immune Response Post-Exercise

Bergstrom Nutrition (Vancouver, WA) has shared new study results that suggest its branded methylsulfonylmethane (MSM) ingredient OptiMSM may help the immune system respond to inflammation caused by strenuous exercise. Researchers found that physically active men supplementing with OptiMSM showed a reduced release of inflammatory molecules after eccentric knee-extension exercise, suggesting potential benefits to the overall immune response.

“We've understood for a while that excessive exercise can dampen the immune system, but these results are pointing us toward believing that MSM might be a dietary ingredient that could be beneficial for overall immunity,” said Tim Hammond, vice president of sales and marketing for Bergstrom Nutrition, in the study announcement.

Writing in the Journal of Sports Medicine, researchers studied 40 healthy men around the age of 25 who were randomized to consume 3 g of OptiMSM or a placebo every day for 28 days. At the end of that 28-day period, all subjects performed 100 repetitions of eccentric knee-extension exercise to induce inflammation. Researchers then evaluated cytokine production in blood before exercise and 72 hours after the exercise to measure the immune response. Researchers also exposed blood samples to the bacterial molecule lipopolysaccharide (LPS) to determine changes in cytokine production.

Participants supplementing with MSM showed lower levels of exercise-induced inflammation in the blood, compared to placebo, as well as a more robust release of inflammatory markers interleukin 6 (IL-6) and tumor necrosis factor alpha (TNF-α), suggesting MSM supplementation resulted in a stronger response in LPS after exercise. Taken together, the results suggest that “MSM appears to dampen the release of inflammatory molecules in response to exercise, resulting in a less incendiary environment, allowing cells to still have the capacity to mount an appropriate response to an additional stimulus after exercise,” researchers concluded.

“The study suggests that MSM proactively reduces damage caused by excessive exercise, which in turn allows the body to mount a better immune response, leading us to believe in MSM’s antioxidant capabilities,” said Marie van der Merwe, PhD, assistant professor at the University of Memphis and lead author of the study, in a press announcement. “An immune system that isn’t overly taxed is better able to fight infection, whereas an overly stressed system cannot mount an appropriate response. MSM attenuates tissue inflammation, thereby reducing excessive tissue damage and preventing immune suppression.”
DigEZyme Enzyme Complex Alleviates Muscle Soreness after Exercise, Study Suggests


DigEZyme, a multi-enzyme complex from Sabinsa Corp. (East Windsor, NJ), may be best known for its place in the digestive-health market, but a new study suggests the complex may also help athletes recover from strenuous exercise. Researchers found that healthy athletes supplementing with DigEZyme showed significant improvements in pain and muscle tenderness following eccentric exercise—measures suggesting improvements to delayed onset muscle soreness (DOMS).

The prospective, double-blind, placebo-controlled trial included 20 healthy men with no known musculoskeletal pathology. At baseline, subjects participated in an eccentric exercise session that included running on a treadmill at a speed to achieve 80% of predicted maximal heart rate for five minutes, followed by 30 minutes of running at a treadmill grade of 10%. Then, for the subsequent three days, subjects were randomized to consume either a placebo or 50 mg of DigEZyme, which consists of the enzymes amylase, protease, lipase, cellulose, and lactase, three times per day.

On each day of the study, subjects visited a clinic so researchers could assess markers of DOMS. That included muscle-soreness questionnaires, in which participants rated their general soreness in response to an algometer that applied direct pressure on muscles. Researchers also asked participants to use a handheld dynamometer to measure muscle strength during maximal voluntary isometric contractions, and the McGill pain questionnaire was used with an algometer to assess muscle tenderness. Additionally, researchers assessed serum biomarkers creatine kinase and lactate dehydrogenase before exercise and 72 hour after exercise.

Researchers found that the DigEZyme group experienced significant improvements in algometer readings of thigh muscle, as well as decrements in the McGill pain questionnaire with “high statistical significance.” A reducing trend was observed for the serum biomarkers of muscle damage, creatine kinase and lactate dehydrogenase, but no statistically significant changes were observed for muscle power or grip strength as measured by the handheld dynamometer.

“The study results suggest that compared to placebo, multi-enzyme complex supplementation improves the outcome measures related to DOMS induced by standardized eccentric exercise,” researchers concluded. “This new study gives a new twist to a classical product of ours, DigeZyme,” said Shaheen Majeed, marketing director for Sabinsa. “Well known for use in digestive health, we have now studied DigeZyme for this specific sports indication. Enzymes have been part of the sports-supplements category, and DigeZyme has enjoyed its place in many sports products, mainly to have enzymes break down proteins and carbohydrates. Sabinsa has now given an additional clinical indication that no other enzyme blend has done before—DOMS. Our blend for this indication is now patent pending.”

BLACK-MUSLI EXTRACT BOOSTS TESTOSTERONE IN RATS, STUDY SUGGESTS

Cepham Inc. (Piscataway, NJ) has shared new, soon-to-be-published study results that suggest its black-musli extract (Curculigo orchioides), BlaMus, may help boost testosterone levels in rats.

The study included 24 male Wistar rats that weighed 200–230 g at baseline and were housed in optimal laboratory conditions. For 28 days, the rats were randomized to one of four treatment groups, receiving oral administrations of BlaMus of either 0 mg/kg body weight, 10 mg/kg body weight, 25 mg/kg body weight, or 50 mg/kg body weight. Researchers monitored rat body weight, free testosterone levels in serum, total testosterone levels, liver function based on SGOT and SGPT levels, and kidney function based on serum creatinine and blood urea nitrogen (BUN) levels.

While no marked elevation in serum free testosterone levels was found in the 10-mg or 25-mg BlaMus groups, the 50-mg group showed a significant increase in serum free testosterone levels after 28 days of supplementation, Cepham reports. Serum total testosterone levels, on the other hand, did not show significant increases in any of the studied groups.

Another positive sign came from histopathological analyses, including assessments of the rat seminiferous tubules, spermatogenesis, sperm-cell morphology, Leydig cells, and Sertoli cells, which revealed BlaMus dose-dependent improvements in the structural integrity of these features, according to Cepham.

“These data demonstrated that BlaMus may serve as a safe and novel natural testosterone booster, and provide broad-spectrum applications in sports nutrition, muscle building, and exercise pathophysiology,” researchers concluded. The study also found there were no significant changes observed for serum SGOT, SGPT, BUN, or creatinine kinase levels in any treatment group, so the results also support the safety of BlaMus.

Debasis Bagchi, PhD, chief scientific officer for Cepham and one author of the study, told Nutritional Outlook that the study results would be presented at this year’s Experimental Biology 2017 meeting in Chicago and that Cepham planned to submit the study manuscript for peer-reviewed publication in April.
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Supplements in Practice

A sports dietitian’s take on dietary supplement usage by professional athletes.

BY JENNIFER GREBOW, EDITOR-IN-CHIEF

We often talk about how a growing number of weekend warriors and everyday athletes are increasingly embracing sports nutrition supplements. But what about the professional athletes for whom supplementation involves more than just a hobby, but a career? How are these athletes now being advised to incorporate sports supplements in their training regimens?

We spoke to Erika Whitman, RD, CSSD, team sports dietitian at The Madison Square Garden Company in New York, about the role supplementation plays in professional sports today. Whitman is the team dietitian for all Madison Square Garden sports teams, including the New York Rangers, New York Knicks, New York Liberty, Westchester Knicks, and Hartford Wolf Pack.

Nutritional Outlook: As a sports dietitian, what do you believe are the biggest benefits of supplementation for athletes?

Whitman: Supplementation can assist with specific nutrient needs that an athlete might not be getting in adequate levels through the diet alone. It may be as a result of food choices or preferences, which we will always address and discuss but may not be something they are able and/or willing to adjust in diet alone. Supplementation provides another avenue of getting necessary nutrients an athlete might need. They may also have increased needs for certain nutrients at certain times to aid in recovery or certain training regimens that might benefit from assuring there is no insufficiency or deficiency in a nutrient that might be critical for the body’s optimal performance levels to be achieved.

What kinds of gains have you seen athletes experience as a result of supplementation? I have seen athletes increase blood values from deficient or insufficient levels to adequate levels through supplementation. There is also a lot of anecdotal feedback. An athlete might state it helps[es] with energy levels and feeling like they can perform better and/or longer. I have also seen electrolyte supplementation significantly decrease cramping and signs of dehydration.

How do you typically recommend that athletes incorporate dietary supplements in their health and wellness regimen?

When discussing supplements with any athlete, the approach is consistency and timing, depending on the training schedule as well as individual nutrient needs.

How often do players ask you, if at all, whether or not they should take a dietary supplement? The question isn’t usually “Should I take this or not?” but “Hey, Erika, what do you think of this?” They then hand me something or pull up a picture of something on their phone they want me to check. That happens on a somewhat regular basis, but I also am in a situation where we provide the supplements that we believe are necessary and will benefit the athlete, so that helps limit their need or desire to look elsewhere for various supplements.

How closely do you work with an athlete’s physician or trainer, if at all, when designing a supplement regimen?

I have great relationships with physicians and trainers, and we always work together on recommendations and implementation of supplement regimens.

What steps do you and the athletes you work with take to ensure that supplements are free of banned substances?

We primarily provide only NSF Certified for Sport products, as we know they have specifically been tested to assure they are free of banned substances as well as true to the ingredient label. It is important that products have gone through third-party testing to provide a sense of security of knowing what you are getting in the product, as supplements can hit the shelves without any label guarantee of knowing what is really in the container. It is a risky business and something we have to constantly remind our athletes about, as many believe supplements have the same requirements as food, which is simply not true. Supplements in food is something we have to constantly remind our athletes about, as many believe supplements have the same requirements as food, which is simply not true. Supplements in food is something we have to constantly remind our athletes about, as many believe supplements have the same requirements as food, which is simply not true. Supplements in food is something we have to constantly remind our athletes about, as many believe supplements have the same requirements as food, which is simply not true. Supplements in food is something we have to constantly remind our athletes about, as many believe supplements have the same requirements as food, which is simply not true. Supplements in food is something we have to constantly remind our athletes about, as many believe supplements have the same requirements as food, which is simply not true. Supplements in food is something we have to constantly remind our athletes about, as many believe supplements have the same requirements as food, which is simply not true. Supplements in food is something we have to constantly remind our athletes about, as many believe supplements have the same requirements as food, which is simply not true. Supplements in food is something we have to constantly remind our athletes about, as many believe supplements have the same requirements as food, which is simply not true. Supplements in food is something we have to constantly remind our athletes about, as many believe supplements have the same requirements as food, which is simply not true. Supplements in food is something we have to constantly remind our athletes about, as many believe supplements have the same requirements as food, which is simply not true.

In addition to banned substances, are there any other primary safety concerns athletes have when taking supplements? There are always concerns when taking a supplement that you have to consider, such as quality and source of the supplement (as well as manufacturing conditions); dosage amounts for effectiveness and safety; interactions with other supplements, medications, and/or foods; and, just as stated before, knowing that what they say on the label is really what it is.

Does personalized nutrition often play a role in the supplement recommendations you make? Absolutely, I don’t provide supplementation recommendations without considering the specific individual’s diet, training, and markers that may indicate any specific nutrient needs as well as timing.
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