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Can You Patent a Natural Product?

Are natural products or ingredients patentable if they rely on naturally occurring substances? The answer to this question has become critical especially over the last decade as companies and patent attorneys are either finding patent filings rejected more often by patent examiners or finding existing patents invalidated or challenged in court.

Challengers argue that inventions related to laws of nature, natural phenomena, or abstract ideas cannot be patented. The result is this: these days in the natural products industry as well as in other industries, there is much confusion about whether or not companies can confidently rely on—and ultimately defend in court—their existing patents. There is also the question of how future patent claims should be constructed so that they stand up to scrutiny.

In March, the "law of nature" debate was highlighted in a case decision involving ingredient supplier Natural Alternatives International (NAI; Carlsbad, CA). NAI owns a number of product and method patents for its CarnoSyn beta-alanine amino acid ingredient. These patents cover NAI's claims that CarnoSyn beta-alanine, when administered as a dietary supplement in humans, "elevates beta-alanine above natural levels to cause an increase in the synthesis of beta-alanyl-histidine dipeptide in the tissue." According to the company, this increase results in a subsequent increase in anaerobic working capacity and athletic performance.

Over the years, NAI has sued a number of companies, including Creative Compounds LLC, claiming that the companies infringed on NAI's CarnoSyn patents. Related to this, in 2017, the U.S. District Court for the Southern District of California ruled that NAI's claims are not patent eligible, stating that it is natural law that ingesting beta-alanine will naturally increase carnosine levels in the body and increase anaerobic working capacity. Had this lower court's decision stood, it would have sent a chilly message to those in the natural products industry investing in patent portfolios.

Thankfully, on March 15, 2019, the U.S. Court of Appeals for the Federal Circuit reversed the district court's ruling, stating that NAI's claims are in fact patent eligible. The federal circuit said that administering beta-alanine in the quantities outlined by NAI's patent in fact "alters that subject's natural state." It said: "Specifically, homeostasis is overcome, and the subject's body will produce greater levels of creatine." In short, the court ruled that the high levels of beta-alanine that CarnoSyn delivers are above any levels of beta-alanine that would occur in nature and thus presents a new use of the ingredient.

This case, as well as others that have come before, highlights the fine line that exists between creating too narrow a pathway that precludes companies from patenting anything at all related to a natural occurrence, and alternatively creating a situation in which someone would be able to patent, too broadly, and block from others all uses of something related to a natural occurrence.

The patent office is struggling with this line. These days, say the patent attorneys interviewed in this article, we are seeing more patents being challenged.

"One of the reasons [this case] picked up everyone's interest when it happened at the district court level is that method-of-treatment claims using a combination of natural products or a natural product was thought by most in the industry to be the acceptable way to potentially patent something," says attorney Brent Batzer, a partner at Amin Talati Upadhye. "A [patent for a] composition that is just straight up a natural product would be difficult to get, but an application of that natural product, for a specific treatment, was thought to be the appropriate way to get a patent, even when the patent office was using its perhaps unnecessarily narrow guidelines and rejecting a lot more things on this patent subject matter basis."

"People were watching this," he continues. "It's of interest to everyone who has been investing in a patent portfolio."

The federal circuit's ruling has righted the ship for now. For the time being, it "is confining what people have thought was appropriate for supplement patents, these method-of-treatment claims," says Batzer.

Following this case, says Kevin Bell of Porzio, Bromberg & Newman, the attorney who represented NAI in the federal circuit case, "Supplement companies should feel a lot more secure that the intellectual property they have or are trying to get has value to it and can be used to protect their products...I think this case did a very good job of clarifying where these lines should be drawn in looking at patents, especially related to inventions involving natural products."

In a press release, Mark LeDoux, NAI's CEO and chairman of the board, said: "The court's ruling means members of the supplement industry can and should continue to avail themselves of U.S. patent laws as well as regulatory tools, such as NDI [new dietary ingredient notifications], to protect their significant investments in clinical research, product development, substantiation, and testing for innovative products and uses that benefit consumers every day."

Read the full version of this story at NutritionalOutlook.com/trends-business/can-you-still-patent-natural-product

Jennifer Grebowa
Editor-in-Chief
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FDA Sets Date for Public Meeting on CBD

On April 2, then-FDA Commissioner Scott Gottlieb, MD, announced several steps the agency is taking to evaluate potential regulatory pathways for supplements and foods containing hemp-derived cannabidiol (CBD). In February, Gottlieb stated that FDA would hold a public meeting on the issue, and now, in his April statement, the Commissioner announced that the meeting will take place on May 31, 2019, from 8:00 AM to 6:00 PM. Requests to make oral presentations and comments at the meeting should be submitted by May 10, 2019, although electronic and written comments will be accepted by FDA until July 2, 2019.

The Commissioner also announced the formation of a high-level internal agency working group exploring potential regulatory pathways for hemp-derived CBD products, which will be co-chaired by principal deputy commissioner Amy Abernethy, MD, PhD, and principal associate commissioner for policy Lowell Schiller. The working group will consider FDA’s options under its current authority as well as potential legislative options. There have also been updates to the agency’s webpage containing answers to frequently asked questions on the topic of cannabis and cannabis-derived products.

Coinciding with this announcement, FDA also announced it has issued multiple warning letters to companies marketing CBD with unsubstantiated claims, sending the message that the agency is serious about enforcing its authority over CBD products.

There are still many unanswered questions regarding the long-term safety of CBD, said Gottlieb, citing potential for liver injury from using Epidiolex, the CBD drug FDA approved for treating epilepsy, as well as unknowns about the cumulative exposure to CBD if people have access to it across a range of consumer products.

“It’s critical that we address these unanswered questions about CBD and other cannabis and cannabis-derived products to help inform the FDA’s regulatory oversight of these products—especially as the agency considers whether it could be appropriate to exercise its authority to allow the use of CBD in dietary supplements and other foods,” says Gottlieb. “As I stated in December, the FDA would only consider this path if the agency were able to determine that all other requirements in the FD&C Act [Federal Food, Drug, and Cosmetic Act] are met, including those required for food additives or new dietary ingredients.”

“FDA’s current position on the lawful status of CBD shouldn’t be misinterpreted to mean that FDA does not regulate supplement or food products that contain hemp or CBD,” said AHPA president Michael McGuffin, in a press release. “Hemp and CBD companies should maintain compliance with established regulations for dietary supplement and food products to ensure quality and safety.”

In the guidance policy, AHPA recommends that manufacturers, labelers, packers, holders, or marketers of dietary supplements or food containing hemp or CBD “comply with the following federal regulations that apply to such operations: food facility registration; current good manufacturing and good agricultural practice regulations; labeling requirements, including nutrition labeling, allergen disclosure, listing of required contact information, absence of drug claims, etc.; new dietary ingredient and food additive provisions, where applicable; and also, that dietary supplement operations comply with applicable obligations for timely submission to FDA of any received serious adverse event reports associated with their products.”

AHPA Releases New Guidance Policy for Hemp-Derived CBD

The American Herbal Products Association (AHPA; Silver Springs, MD) has adopted a new guidance policy for dietary supplements and food products containing hemp and hemp-derived CBD. AHPA says it developed the guidance to encourage industry to be mindful of federal regulations that apply to these categories, keeping in mind FDA’s current position on CBD—that, as of now, CBD is not legal in food and supplement products—despite the agency’s ongoing review of potential legal pathways.
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Industry insiders and observers know: The changes rocking the dietary supplement retail landscape have been nothing short of whiplash-inducing. (Fortunately, the marketplace is rife with products to help ease the resulting inflammation.)

Yet the changes keep coming. For just when you thought that online purchasing and Amazon had shaken things up enough, a spate of new supplement subscription services are promising to bring personalized nutrition directly to consumers, right when they need it.

And as far as Jason Brown is concerned, it’s an idea whose time has come. “A dramatic shift in supplement retailing is occurring,” he says. “Consumers want more than the cookie-cutter supplements found on retail shelves. They want personalized recommendations unique to their own bodies, delivered conveniently to their doorsteps every 28 days.”

Of course, Brown—founder and CEO of Persona (Snoqualmie, WA), one of the subscription services generating the whiplash—has a dog in this fight. But if you think he and likeminded entrepreneurs are imposing the trend upon the industry, you’d be wrong. “The force driving this is the consumer,” Brown maintains, “and their desire for high-quality, sustainable nutritional supplements made just for them.”

So retailers and brands might want to consider signing up to the subscription model—at least for a trial run.

What’s Old Is New Again
In some sense, the supplement subscription service might not be all that revolutionary a concept. Lisa C. Buono, client insights principal, healthcare vertical, IRI (Chicago), seems to recall that as far back as the 1990s, GNC looked into experimenting with such services. “And I believe,” she adds, “that mail order companies have been doing this for years.”
The model’s appeal is easy to grasp, especially from the consumer’s standpoint. “Subscriptions eliminate the need for an additional shopping trip—either digital or in-person—by providing consistent supply,” Buono notes. “And anything that makes the consumer happy when it comes to shopping tends to work.”

But as for the core impetus behind the shift to subscriptions, online’s influence is impossible to understate. “Without a doubt,” says Matthew Oster, head of consumer health, Euromonitor International (Chicago), “we’re in a phase in the development of supplement retailing where interest in the category, and thus sales growth, is driven largely by e-commerce.”

The Move Online
He calls this the “third wave” in the evolution of supplements retailing, with the first being the rise in the 1990s and early 2000s of “health-food” shops with considerable space given to supplement options, and the second being what he calls “the massification of supplements, with parapharmacies and grocery retailers devoting large amounts of shelf space to a broader array of supplement options.”

But this stage is different. “The movement online stems from a few changes to consumer behavior,” Oster explains. “More consumers—and especially younger ones—have become accustomed to getting health information online rather than through a physician or pharmacist,” he says, making their initial move to online purchasing “a natural” next step in the progression.

Online supplement shopping also picked up pace subsequent to the subscribe-and-save options that Amazon began offering on many brands earlier this decade. More recently still, companies have deepened their online strategies by leveraging online influencers and peer networks.

Indeed, Oster observes, “Many niche and emerging supplement brands promote their brands through social media platforms like Instagram, and forgo store-based retailers for Amazon—or, increasingly, remove the middleman altogether and sell their products directly to their consumers.”

Special Delivery
Enter the subscription service, which has “emerged as a promising area for future growth in supplements,” Oster says. “The market is only a few years old, but it’s taken advantage of the consumer trends driving the industry now.”

In addition to the trends mentioned earlier, Oster lists others—the demand for transparency in ingredients, their sourcing, and their benefits; consumers’ insistence on knowing how a product will meet their personal health goals—as pivotal to making the subscription model a going concern.

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“Mass-produced supplements can only realistically get us partway to answering these questions,” he says, noting that dividing consumers into somewhat crude segments like seniors, women, teens and expectant moms fails to acknowledge their individual needs sufficiently even to hope to meet them.

“An increasingly vocal minority of consumers is demanding more information, and a more personalized approach,” Oster concludes. “Subscription services go right to the point of these requests: not being designed as mass-oriented products, they have the ability to provide much more transparency in sourcing and ingredients than ever. Their entire business model is also constructed around designing products with an individual in mind, rather than a broad group.”

Personal Growth

That’s certainly Persona’s approach, and to hear Brown describe it, it’s working. “Given the successful response to our new multivitamin, rebrand, and charitable spirit,” he says, “Persona has rapidly expanded and is forecast to earn 3,000% year-over-year growth in 2018.” With more than 450,000 consumers taking the service’s personalized nutritional assessment in 2018 alone, and with more than 40,000 orders shipped since launch, “We’ll continue our aggressive growth in the coming months.”

Subscribers will likely lap it up, Oster predicts, for the simple reason that despite their reputation for being demanding, “these same consumers, paradoxically, are stretched for time and actively request help in finding the right product for them.”

This is especially so in the supplement space, whose size, opacity, and potential to perplex make it “readymade for a trusted curator,” Oster says, “especially if that curator also offers products with a personalized touch. Subscription services fill the role of curator and adviser for the consumer who’s engaged with health, but stretched for time or in need of a helping hand.”

What’s Next?

For his part, Brown is bullish not just on the subscription model, but on its next stage of evolution.

“As this movement continues to build momentum,” he says, “we predict that the model will lend itself to retail popups that allow consumers to engage with registered dietitians and nutritionists to guide them through initial nutritional assessments and recommendations. Once they’re set up on their subscription services, consumers can easily connect remotely with nutritionists for questions or changes in their individual plans.”

After that, the sky’s the limit. “Going forward, the supplement subscription platform—especially the personalized nutrition model—will be a retail force to be reckoned with because it’s going to transform how consumers identify the best supplements for their health goals while also providing them safe options,” Brown concludes. And when an opportunity like that knocks, brands should be ready to open the door.

Here’s how brands can open the door to subscription opportunities.

Safety First

Dietary supplements, it goes without saying, are safe, wholesome, and healthful. But one truth underscored by the subscription model’s emphasis on personalization is that not every supplement is safe, wholesome, and healthful for every consumer.

“For instance,” Brown says, “many consumers don’t realize they should consult their healthcare practitioner prior to starting a nutritional supplement regimen.” Yet 40% of Americans taking prescription medications and dietary supplements were unaware of drug-nutrient interactions, according to a national survey that Persona conducted earlier this year with Wakefield Research.

So to keep those consumers safe, his company conducts a nutritional assessment of potential subscribers that cross-references more than 650 prescription medications as a prerequisite to delivering a supplement recommendation, let alone to delivering the actual supplement subscription. (Read more about Persona on page 22.)

Going Pro

Supplement safety is serious stuff that shouldn’t be left to chance. So Brown advocates that subscription services not only thoroughly assess the needs and health states of potential subscribers, but staff up their own organizations with professionals who know the ins and outs of nutrition.

“Build a medical advisory board that’s more than just credentialed experts on your website,” he says. “Surround yourself and your business with healthcare practitioners who really care about the wellness of others and are dedicated to developing nutritional supplements that are high-quality, safe, and deliver efficacious levels of important nutrients.”

Indeed, the customer care representatives at Persona are registered dietitians and nutritionists with professional degrees and educational backgrounds in nutrition—so they can provide quality and safe recommendations for our subscribers,” Brown says.

And don’t limit this approach to the medical side of things, he adds. Supply chain, marketing, legal, technology, operations—all teams contributing to a subscription service’s success deserve professional players, don’t they?

Listen Up

Brown revels in—and is quick to mention—the 450,000-plus nutritional assessments his company has completed with subscribers, and not just because they reflect the subscription service’s success. The insights his staff gleams from those assessments, he says, “are endless. And valuable.

“We’re developing more than 40 new nutritional products to launch before the end of this year,” Brown says, “and it’s all because of listening to our customers.”

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Just as important as listening to customers, he adds, is being there for them. “You also need to be accessible,” Brown notes. “That’s why we have nutritionists easily reachable by phone, e-mail, or webchat seven days a week for our customers to access when they need help.”

**Getting to Compliance**

It’s a fact universally acknowledged among nutrition professionals: A consumer’s purchase of a supplement is only the first step in a journey toward wellness. Actually remembering to take that supplement on a regular basis is the long road they’ll have to follow if they ever want to get there.

And here, subscription services can help. “Consumers routinely under-consume supplements,” Buono observes, “and subscriptions could increase compliance to get them up to true daily consumption.”

Brown agrees. “We know it’s difficult always to remember to take supplements. So in October, we launched our new app to give subscribers the ability to set daily reminders to take their vitamins, while making it easy to connect with one of our on-call nutritionists in real time through a call, e-mail, or app chat.”

As far as Brown can tell—and he’s done his research—Persona’s is the only app whose daily reminder feature automatically adjusts time zones as subscribers travel, too. “So they can consistently take their supplements while on the go.”

**Don’t Overwhelm**

The potential subscription services have to revolutionize effective supplement delivery and compliance can seem like it’s all upside.

“But there’s a downside here,” Buono cautions. “When the human-nature part of supplement consumption takes over and we forget to take them a day or two here or there”—the best-laid efforts of those reminder apps notwithstanding—“the continuing subscription could aggravate the user by causing a pileup of unused product and wasted spend.”

Add to that the time and energy—ever in short supply these days—it takes to suspend or terminate the service and the customer may find themselves aggravated even further. “So I do think subscriptions work if they don’t overwhelm and if they adjust,” Buono concludes, “and if they still provide the consumer with info on what’s new, and with an alternative to being locked in to the same old, same old.”

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.
At a fundamental level, you’d think that the dietary supplement and pharmaceutical industries would have plenty in common, given their shared raison d’être of making people well. Thus, you might also think that the stage would be set for the two fields to persist in peaceful, mutually beneficial coexistence.

But then you might be wrong. For historically, when pharmaceutical and supplement brands have pursued, promoted, or sold products featuring the same, or similar, actives, they’ve tended to find themselves in sometimes hostile positions over who ultimately reaps the commercial benefits of supporting wellness.

That tendency can shift at times, however, as diverse parties with a stake in some emerging ingredients are proving that a shared interest can serve both sides—and all consumers—well by furthering science and public health at the same time.

Evolving Dynamic

Back in 1994, Steve Mister, president and CEO, Council for Responsible Nutrition (CRN; Washington, DC), was working at the Nonprescription Drug Manufacturers Association—now the Consumer Healthcare Products Association—and “had a front-row seat to the passage of DSHEA,” he says.

Of course, DSHEA is the Dietary Supplement Health and Education Act, which overhauled how FDA defines and regulates...
dietary supplements, and in the 25 years since its enactment, “The relationship between the pharmaceutical and dietary supplement industries has transformed dramatically,” Mister contends. And for the good.

But prior and leading up to the act’s passage, Mister recalls an antagonistic dynamic that led each side to view the other suspiciously. “The supplement companies felt that ‘Big Pharma’ was trying to redefine the field and provide a ‘pill for every ill,’” he says. “On the other hand, the pharma companies looked at the supplement companies as snake-oil sellers peddling potions in bottles. So there was a great deal of tension between the two.”

A quarter century later, the very fact that many of those pharmaceutical and supplement firms have merged to create massive organizations serving both patients and consumers is a sign of just how much that dynamic has flipped. Pharmaceutical firms “see that there’s a market for supplements, there’s consumer interest in them—and the science around them has gotten so much better,” Mister says.

**Omega Issues**

Yet tensions remain, and they reached a flashpoint in November 2018, when Amarin Pharma Inc. (Dublin, Ireland), maker of the high-concentration EPA-only omega-3 drug Vascepa, filed false advertising lawsuits against omega-3 dietary supplement manufacturers Coromega Health Inc. (Vista, CA) and Ormax Health Inc. (Bakersfield, CA), claiming that the companies used results of Amarin’s new REDUCE-IT clinical trial to market their products despite Amarin’s contention that Vascepa’s composition, dose, and regulatory status differ materially from those of the supplements.

Even before this action, Amarin had filed an earlier complaint with the International Trade Commission alleging that synthetically produced omega-3s comprising primarily EPA should not be considered dietary supplements.

So what’s Amarin’s endgame? Mister calls the company’s moves “a prime example of a pharmaceutical firm trying to shut down a dietary supplement application of a particular ingredient.” Yet he believes it by no means sets the standard for how the two sectors should proceed.

Neither does Harry Rice, PhD, vice president of regulatory and scientific affairs, GOED (Global Organization for EPA and DHA Omega-3s; Salt Lake City). “In the case of EPA and DHA,” he says, “the fact that there’s such a strong body of scientific evidence supporting the benefits has obviously led to interest from both supplement and...
pharmaceutical companies in developing omega-3 products.” But that shared interest need not descend into turf war.

As recently as 2004, when FDA approved the highly purified and concentrated omega-3 polyunsaturated fatty acid drug Lovaza as the first prescription omega-3 product, “supplements and pharmaceuticals were coexisting peacefully in the omega-3 space,” Rice points out.

And Mister adds, “Lovaza is doing just fine”—no legal action required. “So I don’t think we can characterize what’s going on with Amarin as an industry-wide approach,” he continues. “Amarin is one company that’s trying to gain a monopoly over an ingredient. But you’ve got another company”—Lovaza’s “...trying to gain a monopoly over an ingredient. And it all has to do with FDA’s Investigational New Drug (IND) process.

That process, the language of which resides primarily in 21 CFR 312 (the Code of Federal Regulations), spells out the path that pharmaceutical companies must follow in getting FDA’s permission to start human clinical trials and ship an experimental drug ingredient across state lines, and it comes into play with Epidiolex—and whenever any pharmaceutical and supplement firms are pursuing the same ingredient—because it specifies that if a potential drug ingredient had been under investigation for use as a drug ingredient before appearing on the market as a supplement, precedence then goes to the drug application and the parties studying it, and supplement makers cannot legally use the ingredient.

By contrast, if a supplement was in legal commerce before being studied for pharmaceutical use, then the supplement can stay on the market regardless of whether any drugs are developed—and if they are, they’ll have to coexist with the supplements. As Lovaza does with old-fashioned fish oil.

The R&D Pot of Gold

Then again, if a pharmaceutical firm wants to guard the pot of gold it sees at the end of its R&D rainbow, you almost can’t blame them. Joseph Dowling, CEO and CFO, CV Sciences (San Diego, CA), certainly sees their side of the story.

Perhaps that’s because CV Sciences operates both a drug-development division focused on using synthetic cannabidiol (CBD) in new therapeutics and a consumer-products division that makes and markets plant-based over-the-counter CBD products. “So we understand the regulatory framework on both the CPG side and the drug-development side,” Dowling says.

They also understand that “the amount of work you have to do to get to where you can produce commercial quantities of a drug and get FDA approval for a specific indication—just submitting the science on the active compound, whether it’s preclinical or clinical work, then all the manufacturing that goes into it, all the controls around that—is a massive undertaking. And it takes a lot of money.” The upshot: “If you’re trying to commercialize something, you want to have a monopoly if possible,” he says.

But, Dowling continues, “The question is, ‘Is anyone entitled to that?’ And when it comes to CBD, ‘We think strongly that the answer is no. It’s been around for thousands of years.”

Investigational Pushback

Within the past year, Epidiolex (GW Pharmaceuticals; Salisbury, England) became the first FDA-approved drug made from CBD. As a treatment for patients with Dravet syndrome, a severe form of epilepsy, the drug represents a milestone for cannabis science; yet at the same time, FDA’s imprimatur could render dietary supplements containing CBD illegal. And the difference between this and the more litigious environment surrounding omega-3s “may lie,” Rice surmises, “at least in part, in the relative maturity of the industries. While the omega-3 industry is still young, it pales in comparison to the infancy of the CBD industry.”

Wild West for Now

Indeed, Dowling and others compare the consumer side of the CBD marketplace to “a Wild West,” he says. “You have companies like us that are taking it very seriously and following FDA’s rules and regulations, both on safety and on marketing. But if you were to look at the brands out there, probably more are breaking them than following them. So we’re going to be in this Wild West for a while, and at some point FDA will step in more heavily. And I think the market will hopefully speak to this, as well, by rewarding players like us who follow the rules.”

Meanwhile: regulators gonna regulate. It is their job, and it’s “the very tough job of protecting public health,” says Mister. “So better to err on the side of protection than on the side of free market access.” (And wherein the last time you heard a trade-group representative say that?)

Besides, even with increased regulations, Dowling believes that the copacetic climate surrounding CBD can last. “It looks to me like FDA wants to have an opening not just for dialogue and public comment, but to build a path forward for responsible participants to develop products and science over time.” FDA recognizes that CBD will capture a huge audience, and if the agency can avert some of the challenges it’s faced from other ingredients and the claims made for them, it’ll save itself, the industry, and consumers a lot of trouble.

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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Cast your gaze across a contemporary supplement shelf crowded with ever-more fine-tuned formulations and you could be forgiven for asking: Do they even make plain-old multivitamins anymore? They certainly do, and for good reason: We need them. According to the latest National Health and Nutrition Examination Survey (NHANES), nearly one-third of American adults may be teetering on the edge of at least one vitamin deficiency. And but for the humble multivitamin—whose users have only a 14% risk of deficiency, compared to the 40% risk found among those who don’t take dietary supplements at all—we might tumble over the precipice entirely.

This is hardly lost on Tamara Bernadot, co-founder and chief nutrition officer, Persona (Snoqualmie, WA), who observes that “based on nutrition intake studies, there’s a real need for a daily multivitamin to help adults meet the recommended intake levels of essential nutrients that the body can’t make on its own.”

But, she continues, “To take nutrition to a new level—and to stay relevant with consumers—there’s also a need for multivitamins to go beyond meeting daily minimums.” Fortunately, today’s multivitamins are doing just that while still providing the reliability, affordability, and ease of use that make them invaluable backstops to our sometimes less-than-optimal diets.

**Feeling Needy**

If even conscientious consumers fall short of optimal eating, it’s not for lack of trying, says Sara Cullen, founder and CEO, GEM Vitamins (Venice, CA). “As much as we’d love to get all our nutrition from a colorful, well-rounded daily diet,” she contends, “it’s nearly impossible for three reasons.”

One, she and others claim, contemporary agriculture has yielded successively...
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Vitamins

Growing Big and Strong

So it’s heartening to learn that the 2018 CRN Consumer Survey on Dietary Supplements once again affirmed the multivitamin as the most popular dietary supplement in overall use across generations and genders—a spot it’s held for two decades.

Notable, Shao adds, is the 83% share of supplement users in the 18-to-34 age bracket who take a multivitamin—an 8% jump over the previous year. “This increased popularity among younger adults points to an interest in simple supplementation and further emphasizes that consumers continue to take supplements to support their overall health and wellness,” he says.

But don’t just take CRN’s word for it. Lonza Consumer Health & Nutrition (Morristown, NJ) commissioned a study1 from the Natural Marketing Institute (NMI) that also found multivitamins “to be the type of supplement most consumers use to help ensure they’re getting the nutrients they require,” says Juliana Erickson, senior marketing manager, Lonza Consumer Health & Nutrition.

The NMI data reveal steadily high use over the past 13 years, Erickson continues, with the rate of use rising from 67% in 2005 to 75% in 2018. As far as she’s concerned, that “indicates that there’s still a market for manufacturers of multivitamins.”

Adding to their appeal, multivitamins eliminate the “pill burden” that can be taxing for all users, and especially, Erickson says, for “those supporting multiple health conditions. By combining key nutrients into one dosage form, multivitamins help consumers increase their vitamin intake while also reducing the pill burden.”

Moreover, Shao adds, multivitamins are, quite simply, safe, stable, and consistently high-quality products. “Consumers have always turned to multivitamins as a nutritional insurance policy,” he says. “They bring peace of mind to consumers, who know their diets are seldom what they should be.”
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Remaining Relevant

So what’s not to like? Well, nothing, really. But there’s so much more that consumers could like about multivitamins, if only manufacturers were to work such assets into the formulas.

Many are, because they know that if they don’t, they risk being left behind. As Erickson says, “It’s vital that multivitamin manufacturers continue to drive innovation to differentiate themselves in a mature, low-growth market.”

Shao agrees, noting that while multivitamins “have remained stable for the past several decades, there have been interesting advances.” Some brands, he says, are experimenting with what he calls “novel ingredients, such as botanicals or other ‘nonessential’ nutrients.” Others, he says, have honed nutrient-delivery formats to improve bioavailability, or delay or promote rapid absorption.

On that front, Erickson says, “Modified or timed-release profiles continue to gain prominence in multivitamin and combination products to help ensure that active ingredients reach their intended target location in the body while also masking odors and taste for a better consumer experience.”

She says that beadlet technology helps manufacturers achieve these goals, enabling a multivitamin to deliver its payload throughout the day. The technology also has the advantage of letting manufacturers combine otherwise incompatible ingredients into a liquid capsule better to optimize the actives’ effects. “Tablet-in-capsule and lipid multiparticulate, or LMP, technologies further broaden the delivery options,” she continues, “and, thus, the combinations available to manufacturers.”

As for increasing the nutrient pool, Cullen’s company, GEM Vitamins, makes its vitamins from minimally processed, plant-based, whole-food ingredients, which she believes “your body absorbs best.” And unlike traditional multivitamins, her company’s formulas include ingredients like the adaptogenic herb ashwagandha, the red algae–derived antioxidant astaxanthin, and chlorella, “a green algae known for its heavy-metal detoxing benefits,” she says. “There’s a lot more to food than individual minerals and vitamins. Other micronutrients that aren’t quantified on a nutritional label—things like antioxidants—are just as important for your body. This is another big shift in thinking that we need.”

Formulation Fit

But perhaps the biggest shift in multivitamin thinking involves meeting consumers where they are—in their lifestyles and their life stages.

“In some ways, the reasons multivitamins need to evolve reflect the needs of the supplement category in general,” Shao posits. “The tradition of ‘one size fits all’ in multivitamins could be its greatest limitation. New scientific advances show that individuals have unique health statuses and nutritional needs. Unlike pharmacology, nutrition science tells us that the body’s response to supplemental nutrients is directly determined by its baseline nutrition status, and everyone’s different.”

Indeed, says Cullen, “The recommended dietary allowances—RDAs—haven’t changed much since they were created in the 1940s and are based on trying to find a one-size-fits-all solution for 99% of the population. Secondly, our modern lifestyles have contributed to all kinds of new stressors for minds plus bodies than ever before. So it’s time we change what our daily essentials should be and how much we need to supplement with.”

In response, brands are fitting formulas to distinct demographics. “Multivitamins have been developed aiming at different age groups—kids, teens, adults, older adults—different genders, the physically active, and so-on,” Shao notes. “And with advances in science, companies can get even more specific in providing personalized products and formulas according to one’s individual health profile. So the trend of personalized multivitamins will continue, all the way to each consumer receiving his or her unique formulation.”

Erickson adds that not only are multivitamin formulations focusing on specific consumer groups; they’re helping consumers achieve specific health goals, as well. “Consumers increasingly seek solutions to support their busy lifestyles and the pressures of modern life,” she says, “making formulations for mood health and stress, cognitive health, eye health, sleep support and energy popular.”

On the Levels

But none of this matters if the formulations don’t deliver the right nutrients in the right amounts—and here, Bernadot contends that legacy multivitamins have room for improvement.

“Based on our review of the current multivitamin market, traditional multis—and even some that are part of personalized- or subscription-based models—really only deliver the minimum levels of nutrients,” she says. “But there’s a need for multivitamins to go beyond meeting daily minimums to achieving therapeutic nutrient levels.”

When her company, Persona, launched its Foundational Multi, it made sure that its multivitamin formulas contain at least 50% or more of the dietary value (DV)—while not exceeding the tolerable upper intake limit (UL)—for any nutrient. “There are technical limitations that can make it challenging to achieve this for every essential nutrient,” Shao concedes, with “bulky”...
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minerals like calcium and magnesium typically included at lower levels. But he’s found that most manufacturers offer products with a wide range of vitamins and minerals at levels 30% to 100% of the DV.

**Staying on Trend**

How else can multivitamin makers “speak” to their increasingly diverse, increasingly demanding market?

They can maintain as clean a label as possible, for one. Lonza’s Erickson points out that 59% of respondents to her company’s NMI survey would prefer buying supplements from natural sources. “With this knowledge, and with the rise in interest in plant-based diets, now comes demand for cleaner labels and more transparency about what’s in supplement products,” she says.

Alas, claims Cullen, most multivitamins mirror “processed foods,” with ingredients from “questionable sources, toxic fillers, binders, synthetic colorants, and megadoses of nutrients that do more harm to the body than good.”

Bernadot advises brands to take consumers’ pharmaceutical regimens into account. “In 2017,” she says, “we conducted a study with Wakefield Research that uncovered that nearly 40% of Americans taking prescription medications and dietary supplements didn’t know about drug-nutrient interactions, or DNIs. This is alarming, as many consumers take their nutrition into their own hands—grabbing supplements they need from store shelves where nutritionists aren’t readily available to check possible DNIs.” So when her company prepares personalized nutrition models for its consumers, it cross-references more than 850 prescription medications to avoid risky drug-nutrient interactions.

Making multivitamins pleasant to take can also go a long way toward boosting compliance. Though Lonza’s NMI data show that tablets and capsules remain the preferred format for 41% and 42% of consumers, respectively, Erickson says “the desire for alternative formats is steadily increasing, helping to promote supplement growth across an array of new categories, from beverage shots to bars, and driving the proliferation of gummy-type products.”

If innovations like these keep multivitamins relevant in changing times, “we’re likely to see nutrient gaps shrink over time,” Shao says. “And the very basis for the well-justified use of multivitamins today could very well be reduced tomorrow.” At that point, he says, “the key will be to evolve the value from filling nutrient gaps to promoting health, which most certainly will be an urgent need well into the future.”

**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.

Visit vitacholine.com to learn more.
Once upon a time, when people wanted to be healthy, they ate a variety of whole foods—real ones, sourced mostly from plants and in not-too-excessive amounts (as one modern-day maxim puts it). But sometimes those foods weren’t very tasty, or were available only three weeks of the year. Or people just wanted to eat other stuff.

So mankind came up with an ingenious—and, in some cases, lifesaving—workaround: just isolate or synthesize the good-for-you bits from whole foods and deliver them in handy supplements that let people eat whatever they want while still getting the nutrition they need. And for decades, that system worked; for many, it still does.

But nostalgia being what it is, a growing cohort of consumers now longs to go back to those whole-food days; they just don’t want to sacrifice the expediency of supplements to do so. And contemporary agriculture being what it is, the whole foods they long for may, in fact, not be as healthful as they once were anyway.

So it’s in this gap that whole-food supplements show their promise. And it may be in the interest of public health that they do.

**COMING FULL CIRCLE**

**The promise of whole-food supplements**

**BY KIMBERLY J. DECKER**

**Losing Sight of Whole**

It’s no secret that in Western societies—ours especially—chronic disorders like diabetes, obesity, and metabolic syndrome have succeeded rickets and scurvy as the “new” malnutrition, in the process redefining the condition away from hunger and toward an epidemic of getting too much of the “bad” stuff and not enough of the “good.”

This comes as no surprise to John P. Troup, PhD, vice president of clinical science, education and innovation, and research and development, Standard Process (Palmyra, WI). As far as he’s concerned, the single
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biggest culprit in our downward-trending health status is the simultaneous decrease in nutrient density and increase in the poor-quality carbohydrate content of the highly processed Western diet. "We’ve lost sight of whole foods," he says, "and the whole-food advantage."

That advantage isn’t just a matter of vitamins and minerals, either. "It’s about delivering vitamins and minerals in a matrix that enhances bioavailability," Troup emphasizes. "While vitamins and minerals are important, we’ve now discovered that phytonutrients—or phytoactives—are gaining recognition as key influencers not only of the systems underlying metabolic control, but of gut health and normal gut function."

**Theory vs. Fact**

The good news is that by simply returning more of those phytonutrient-rich whole foods to our pantries, we can, in theory, stabilize or even reverse some of the damage that the typical Western diet has wrought. But what’s simple in theory may be less so in actual fact.

For if it were, most Americans wouldn’t be eating less than half the fruits and vegetables that the 2015 Dietary Guidelines for Americans recommend—fruits and vegetables that, theoretically, should supply the lion’s share of the phytonutrients we need.

And even if we were meeting our fruit and vegetable quotas, conventional farming has rendered most produce less nutritionally potent than it was in generations past, with research showing a 5%-40% decline in the mineral content of foods in the U.S. food supply from the 1930s through the 1980s.

That’s not Saumil Maheshvari’s idea of progress. "Despite the fact that the changes in agriculture and the food industry that occurred over several decades in the late 20th century are publicized as ‘modernization,’” says the marketing analyst at Orgenetics (Brea, CA), "the sad reality may be that the artificially pumped-up yields-per-acre took a hefty toll on the environment and our own health."

**Closing the Phytonutrient Gap**

The upshot is a phytonutrient gap into which eight out of 10 Americans fall, Troup notes. And he’s not alone in believing that whole-food supplementation can help to close it.

Of course, that raises the question of what a whole-food supplement is. And ideally, says Maheshvari, "A whole-food supplement is one that’s entirely derived from foods and contains no synthetic additions"—a pedigree that he believes "helps ensure the vital presence of naturally occurring cofactors and co-nutrients."

By contrast, any supplement that’s not strictly plant derived, that’s synthesized artificially, or that’s otherwise produced via "artificial methods that infuse actives into a matrix-type format,” Maheshvari says, "wouldn’t qualify as whole.

Thanks to these credentials, whole-food supplements, their advocates insist, better deliver the nutrition of whole foods than do isolated, chemically synthesized supplements—which, in their isolation and chemical synthesis, aren’t unlike the processed Western diets they aim to supplement.

"Think of it like this," Maheshvari says, "What makes a car move? It’s not just a powerful engine, or the best tires, or the strongest transmission, etc. A car is truly functional if it has all the parts required, from the engine to the transmission to the tires, and those parts fit and play well with each other." The same goes for a whole-food supplement. By contrast, "If you have a car with a very powerful engine—an isolated active—but thin tires”—insufficient or ineffective cofactors—"the car won’t function optimally."

**Getting the Most Out of Whole**

But even whole-food supplements aren’t created equal; the whole-food source and subsequent processing are instrumental to producing the nutritional density that gives them their value.

Or, as Troup explains, "Through extraction and standardization, we can concentrate the whole-food matrix, including the nutrients and phytoactives available from selected plants, and do so in a way that leaves the matrix unchanged and more conveniently delivers health benefits."

Further, he continues, "From soil to supplement, the manufacturing of our whole-food supplements begins at our company’s 600-plus-acre certified-organic farm shortly after harvest." Standard Process grows over 80% of the raw plant ingredients for its products at the farm, allowing it to extract plant-based, naturally occurring multiform magnesium from Swiss chard and buckwheat for its E-Z Mg product. "This helps ensure the nutrient density in our products, eliminating the need to source and transport crops, which significantly depletes nutrient values and health benefits."
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For its part, Orgenetics produces supplements like its Orgen zinc using a water-extraction technology to concentrate and standardize the formulation to 4% plant-based zinc, with the remaining 96% comprising an organic guava-leaf extract replete with naturally occurring cofactors and co-nutrients. Even better, Maheshvari adds, such standardization lets formulators and manufacturers deliver precise doses in their finished products.

Will It Scale?
Such fine points may not resonate with average consumers, but the broader concept of whole-food supplements does. “I think consumers are starting to shift toward healthier alternatives and see synthetically derived supplements as unhealthy and often overloaded with actives,” Maheshvari says. Thus, “The market is definitely growing, as consumers around the world get more educated and mindful of what they ingest.”

Millennials, in particular, deserve credit for raising whole-food supplements’ profiles, promising to become the category’s largest domestic consumer base in terms of dollar spend. Social media’s phalanx of Millennial influencers “are certainly convincing factors for more consumers to take up whole-food supplementation,” Maheshvari says.

He also sees as a motivator the subjective “feel-good factor” that comes with whole-food supplementation—a product not only of the supplements’ health benefits, but of the ability they provide consumers to support “a clean and perhaps USDA-organic supply chain,” as well, he says. And make no mistake, “The modern consumer is researching not only the science behind products, but the supply chain, too. They want to know what ingredients are in the product, where they’re from, and how they fit into the product they’ll ingest.”

Granted, this supply chain, coupled with whole-food supplements’ painstaking production, makes them costlier to produce, Maheshvari says, noting that his company’s 100% USDA Certified Organic ingredients “require a huge amount of plant material. Compare this to a chemically induced process for synthetic actives, which can be produced en masse in factories.”

And because whole-food supplements come from plants, crop cycles, seasonal variability, and geography can all hamper sourcing. “Some crops are local to certain regions and climates around the world, which makes sourcing difficult,” Maheshvari points out. “This is one of the biggest challenges to ensuring that every consumer can get sustainably sourced ingredients.”

And as manufacturers look for more organic plants from which to derive whole-food supplements, more organic farmland will have to go into production to meet demand. That’s a pricey and lengthy process, and, as such, Maheshvari says, “The challenge here will be somehow to map out demand so that supply catches up in a responsible and sustainable manner.”

And that demand is ramping up, as far as Maheshvari can tell. “I see more brands adapting whole-food or plant-based ingredients in their formulations,” he says, and again, he credits the savvy consumer for triggering the change. “This is such a growing market that many companies see catering to this consumer as their future livelihood.”

Which is only appropriate for a supplement category that, its makers believe, can improve the future health of those who explore it. “Fortunately,” says Maheshvari, “I think the supplement industry is starting to seek much healthier and cleaner options for savvy and health-conscious consumers.”

References
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On any list of top-selling botanical supplements, there are bound to be the usual suspects. Some ingredients have championed the category for years, and yet new (or at least less familiar) ingredients do enter the leaderboards from time to time.

What’s driving these botanical ingredients to sales success? From Ayurvedic ingredients to Western ones, we take a look at some of today’s botanical superstars and the stories behind their success.

Turmeric
It should come as no surprise to learn that turmeric (Curcuma longa) is still a big earner in the dietary supplement space. Sales of the Ayurvedic root last year tallied over $50 million in the U.S. natural retail channel alone, according to recent SPINS estimates. In speaking with turmeric suppliers, it sounds like the ingredient’s ongoing success is a result of both increasingly positive press and research.

“Turmeric has been getting a lot of attention in the press, being dubbed a superfood by popular TV shows,” says Ramon Luna, marketing coordinator for turmeric supplier Ecuadorian Rainforest LLC (Clifton, NJ). “Having turmeric’s history and benefits explained in simple terms to the public has done wonders for the ingredient, and it’s a main reason why turmeric’s had such a stellar rise.”

Beyond mass communication of turmeric as a product worth buying, the scientific research on turmeric and its curcumin content continues at a strong pace. Research on curcumin for joint health in particular is increasing, and it’s likely part of why turmeric sales for joint health rose 32% in the conventional mainstream retail channel last year, says SPINS. But turmeric supplier Sabinsa Corp. (East Windsor, NJ) says research is expanding into other areas of human health too, including cardiovascular health, cancer,
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Turmeric is also starting to show up as an ingredient in the weight-loss category. Due to the lack of recent studies on turmeric for weight loss, it’s safe to attribute those sales to either the press or some very good product branding.

Expect alternative platforms like powder premixes and ready-to-drink beverages to continue gaining traction on traditional turmeric tablets and capsules.

Ashwagandha

Ashwagandha (Withania somnifera) is popular in Ayurveda and most prized for its root. It’s similar to turmeric in that sense as well as for its continued success in the botanicals market.

In the latest Herb Market Report published by the American Botanical Council’s HerbalGram journal, ashwagandha sales grew 26% in the U.S. natural channel in 2017.

While ashwagandha has many purported uses, ranging from general wellness to physical performance, market data suggests the brunt of ashwagandha sales are in mood and sleep categories. In the U.S. specialty retail channel last year, ashwagandha sales jumped 25% for mood and 35% for sleep, says SPINS.

Natreon Inc. (New Brunswick, NJ), supplier of Sensoril brand ashwagandha for global markets, says those sales boosts are backed by clinical research both on general ashwagandha and the company’s own brand. “The strong science supporting the use of Sensoril ashwagandha in the mood and sleep categories has been a key factor driving growth of this ingredient,” says Bruce Brown, president of Natreon. “Clinical evidence shows that Sensoril lowers cortisol levels, and cortisol is nature’s built-in alarm system. It’s your body’s main stress hormone that works to help manage your mood and sleep.”

When asked what a future market for ashwagandha could look like, Brown envisions ashwagandha crossing into trending markets such as CBD and kombucha. In terms of delivery platforms, the ingredient is making its way into beverages, gummies, chews, and foods. Further education should propel the root even further into all markets.

With growing popularity of ashwagandha, adulteration is unfortunately becoming a real issue. A January 2019 report from the Botanical Adulterants Prevention Program—a nonprofit educational program led by the American Botanical Council, the American Herbal Pharmacopeia, and the University of Mississippi’s National Center for Natural Products Research—indicates that unscrupulous companies are selling bulk ashwagandha labeled as root but instead containing ashwagandha leaf, stem, and aerial parts. These cheaper materials contain the same withanolide compounds that are used today as laboratory indicators of ashwagandha root authenticity, but they don’t otherwise share the same phytochemical profile of the root.

With this in mind, last year Sabinsa introduced a new ashwagandha ingredient, called Shagandha, that is verified to meet U.S. Pharmacopoeia-National Formulary (USP-NF) monograph specifications, a fact confirmed by testing laboratory Alkemist Labs (Garden Grove, CA). Testing verified that Shagandha consistently meets monograph specifications for authenticity and is standardized to contain 2.5% withanolides. Sabinsa’s founder Dr. Muhammed Majeed said in a press release that companies must remain vigilant in verifying the identity of ashwagandha ingredients in order to sidestep possible adulteration in the supply chain.

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Fenugreek
Fenugreek (*Trigonella foenum-graecum*) is a longstanding leader in the botanical space. Sales of fenugreek seed extracts jumped 34% in 2017 in the U.S. mainstream market, according to *HerbalGram*.

As a dietary supplement, the plant is sought more for its seeds than anything else. As with other leading botanicals, supporting research on fenugreek is accumulating alongside growing sales. Recently, a trial on men using Furosap fenugreek from Cepham Inc. (Somerset, NJ) linked fenugreek use to gains in lean body mass and total testosterone after three months of use. It’s just one of many studies published on fenugreek of late.

Fenugreek supplier Gencor (Irvine, CA) recently reported the results of a new unpublished study showing that one of its proprietary fenugreek extracts, Testofen, increased strength, aerobic endurance, and lean body mass in healthy, active men. The double-blind, randomized, eight-week clinical trial was conducted at RDC Global with 138 healthy, non-smoking male subjects, and examined changes in lean body mass, fat mass, upper and lower body muscular strength, and endurance. According to the company, results showed that the extract acted in a dose-response manner, with 600 mg per day of Testofen in conjunction with an effective exercise routine demonstrating superior positive effects when compared to placebo or 300 mg of Testofen per day.

Black Seed
It’s not yet a household name in the U.S. botanical market, but black seed (*Nigella sativa*) is now in massive sales growth. According to *HerbalGram*, the ingredient’s sales growth percentage in 2017 was second only to hemp-based cannabidiol (CBD) in the U.S. natural channel.

Despite its lack of familiarity in the states, black seed is reportedly popular in Ayurveda and other systems of traditional medicine. Scientific references are plentiful on the ingredient’s pressed oil.

“The most promising benefit, according to studies, is black seed oil’s superior ability to support a healthy inflammation response, especially when the oil is cold-pressed and standardized to the active constituent thymoquinone,” says Morris Zelkha, CEO of TriNutra Ltd. The company’s ThymoQuin black seed oil is available for bulk purchase through Barrington Nutritionals (Harrison, NY). It’s
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uniquely standardized for thymoquinone, a feat made possible by a selective breeding program yielding high-concentration thymoquinone varieties of the plant, the companies say.

Black seed oil suppliers are as excited by the ingredient's newfound market appeal as they are in sharing the unique research taking place on this tiny seed. Zelkha says one ongoing clinical trial is exploring black seed oil for its potential to improve oxygen consumption in humans.

Last year, Sabinsa reported that its branded black seed extract, Nigellin BCS, was the best-performing black cumin seed extract in an asthma-related study recently published in *Frontiers in Pharmacology* comparing 10 different black seed extract preparations on their potential effects on asthma-related mediators of inflammation. According to the study researchers, Nigellin BCS was found to have the highest thymoquinone content of all the extracts included in the study, at 2.4%; the next closest extract had a 0.7% thymoquinone content, a 300% difference, says Sabinsa.

Black seed oil is sometimes referred to as black cumin, and this alternative name can confuse consumers. After all, black seed oil is entirely unrelated to the cumin spice. Some industry experts are encouraging interested manufacturers to avoid labeling black seed oil products by this alternative name.

**Western Botanicals**

While Ayurvedic plants tend to stand out in lists of today’s top-selling botanicals, there are contenders being cultivated out west. Elderberry (*Sambucus nigra*) and wheatgrass (*Triticum aestivum*) both boasted sales growth of at least 30% in 2017 in the U.S. mainstream channel, *HerbalGram* reports.

Elderberry is particularly rich in vitamin C, quercetin, and antioxidants. Products can be made with both the elderberry flower and fruit—some combine both—but the fruit and its juice allow for a great range of applications. Traditionally, elderberry is associated with potential cold and flu defense. Elderberry suppliers hypothesize that elderberry’s growing sales are influenced by growing concerns surrounding flu season and strengthening flu viruses.

Wheatgrass is popularly farmed in the United States, and its dietary supplement success isn’t necessarily happening in pill form. Brien Quirk, director of R&D at Draco Natural Products Inc. (San Jose, CA), says his company has seen a growing trend in formulating supplements into a drink-based format in which greens like wheatgrass or barley grass are used as the base “since they have antioxidant, nutritive, and detoxification benefits.”

Since wheatgrass is easily cultivated on a mass scale, adulteration isn’t a big issue here. Heavy metal contamination from pesticides may be a concern worth testing for, though.

**References**

1. SPINS data based on U.S. sales during the 12-month period ending November 4, 2018.

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When health advocates call algae a “superfood,” they do mean super. For one, algae have an extraordinary capacity for survival. \(^1\) (Algae is a broad term encompassing macroalgae and microalgae species, either freshwater or marine.)

For instance, macroalgae (also known as seaweed) “have an ancient lineage on our planet,” says Lynn Cornish, a scientist from Acadian Seaplants Ltd. (Dartmouth, Nova Scotia, Canada), a manufacturer of food and functional ingredients derived from cultivated and wild seaweeds. “They were among the first multicellular organisms, here before even the jellyfish and the dinosaurs. They have survived for millennia in all manner of challenging environments, coping at times with hot sun, high light levels, temperature extremes, ice, and hungry sea creatures.”

Algae’s ability to shield themselves from exterior antagonists has enabled many species to build up a rich store of proteins, lipids, fiber, vitamins, minerals, and more—nutrients that coincidentally are sought in today’s human health market. “Algae is at the base of the food chain, and many algae species have adapted to become extremely potent nutritionally for a variety of reasons,” says Bob Capelli, executive vice president, global marketing, for astaxanthin supplier Algae Health Sciences (AlgaeHealth; Irvine, CA), a division of BGG. “For example, *Haematococcus pluvialis*—the microalgae species from which most natural astaxanthin ingredients in the human supplement market are derived today—is an algal species that can hyper-accumulate astaxanthin as a protective force field to ward off all sorts of environmental stressors.”

Part of what makes algae so exciting a nutrition source is that it is nutritionally rich as a whole. Or Gottlib is vice president of marketing for microalgae-ingredient supplier Algatech (Kibbutz Ketura, Israel). Says Gottlib: “Unlike other plant-based foods—e.g., soy, peas, beans, etc.—where only part of the plant is consumed, microalgae biomass is a complete organism, thus containing all the components of the whole structure. It has significant amounts of proteins, lipids and phospholipids, vitamins, minerals, carotenoids,
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MARINE MINERALS

Manufacturers in search of minerals that offer superior absorption might want to look seaward. Suppliers of marine mineral ingredients say that the origin of their ingredients results in a better-quality mineral ingredient.

One of those companies is CK Nutraceuticals (Oakville, ON, Canada). Michael Chernyak, the company’s president, explains why more consumers are turning to marine minerals such as the Deep Ocean Minerals ingredient his company supplies on behalf of the ingredient’s manufacturer, Pacific Deep Ocean Biotech in Taiwan. Deep Ocean Minerals is extracted from deep ocean seawater, whose mineral composition is said to mimic that of humans’, including essential minerals such as magnesium, calcium, and potassium.

“Synthetic mineral sources are generally not well absorbed,” Chernyak explains. “They can deliver high elemental mineral levels; however, the question of bioavailability should be raised. Minerals from nature tend to be better absorbed. For instance, our Deep Ocean Minerals ingredient is standardized to four macro-minerals, including magnesium, and contains over 70 naturally occurring minerals and trace elements.” These minerals and trace elements are not concentrated or isolated, he says; rather, they are left “naturally occurring and synergistic” in the ingredient.

The ocean water from which Deep Ocean Minerals is sourced—2000 feet below the ocean’s surface—is extremely pure. At those depths, the water is not contaminated by pollutants such as heavy metals. In fact, the mineral quality of the deep ocean water is superior to the quality one would achieve from surface water, the company explains.

Chernyak says his company has several published human studies demonstrating the health efficacy of Deep Ocean Minerals. Several recent studies focused on exercise recovery, including one showing that Deep Ocean Minerals water can enhance exercise recovery in terms of aerobic capacity and leg muscle power compared to plain water and another showing that a Deep Ocean Minerals drink helped increase cerebral hemodynamic response in subjects during exercise recovery.

Chernyak says consumer interest in marine minerals is “beginning to develop, slowly but surely.” He says: “The marine-sourced mineral market is still quite nascent; however, there is lots of room for this trend to run. I’m encouraged to see this play out.”

Part of what will drive interest is consumers’ demand for natural ingredient sources. “Consumers are becoming more educated, more aware,” he says. “The ‘natural’ trend does not show signs of slowing, and this is where innovative natural mineral sources come into play, particularly those like Deep Ocean Minerals which are backed by clinical research.”

Another notable marine-mineral ingredient is Aquamin by Marigot Ltd. (Cork, Ireland). The Aquamin line includes marine magnesium ingredients from seawater and multiminerale complex ingredients from marine plants. David O’Leary, commercial manager for Marigot, describes his company’s ingredient more fully: “Our plant-based mineral is derived from the red seaweed species Lithothamnion calcareaum. Our mineral offering has been tested extensively in research across three main areas: bone, joint, and digestive health.”

O’Leary describes the sustainable process by which the Aquamin ingredient is obtained. “Plant-based, aged, non-live/calciﬁed materials are harvested from the fjord beds in the northwest of Iceland. This is where the material is harvested under a rigorous sustainability-management program. As no live material is harvested, no damage is done to the live cover, thereby ensuring the live bed deposits of the seaweed are allowed to continue producing calcified exoskeletons uninterrupted for generations to come.”

These mineral suppliers are also looking to make their ingredients even easier for formulators to work with in an array of products. CK Nutraceuticals says that a powdered version of the liquid Deep Ocean Minerals ingredient is now available “in response to market demand for this format.”

Last year, Marigot introduced Aquamin Mg Soluble, an “instantly soluble” form of its Aquamin magnesium-rich ingredient. “Our product offering has been tailored for application in multiple delivery systems—foods, beverages, capsules/tablets,” O’Leary says. “We have focused on the ability to provide application-based solutions ranging from powders to granulated grades, soluble beverage grades, and dispersible-in-low-pH grades.”

and carbohydrates, all high quality for human consumption.”

“Nutritionally,” says Cornish from Acadian Seaplants, “seaweeds typically contain all the essential nutrients required for human health and wellness, with the exception of adequate calories.”

A Growing Market

While algal ingredients are not new in the nutrition space, interest in these ingredients is growing, for several reasons.

“Consumers are turning to algae-derived ingredients more and more as we continue to see a booming demand for plant-based ingredients,” says Tryggvi Stefánsson, science manager, Algalif (Reykjanesbaer, Iceland), supplier of the Astaﬂ af astaxanthin brand.

Another reason for the interest has to do with one of the biggest challenges humans will face for centuries to come: how to sustainably feed the earth’s growing population from a planet whose feed supply is limited.

“In the face of growing shortages and strains on our resources, and the increasing demand for proteins, lipids, carbohydrates, and other valuable ingredients—especially those that are vegetarian, sustainable, environmentally friendly, and organic—it’s a given that microalgae will play a significant role in the diet of all populations during the next decade,” says Algatech’s Gottlib.

He continues: “Microalgae are on the way to becoming a leading food source of the 21st century...In fact, microalgae contain the nutritional formula for humankind to flourish over the coming decades.”

Stefánsson adds that “algae are more sustainable than conventional crops because they require significantly less energy/input to be kept alive, thereby limiting environmental impact. It is a renewable source of proteins.
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Discover the benefits of using fermentation to augment and refine the botanical extract ingredients you use in your product lines! Fermentation processing is a feature you can add to Draco extracts and formulas to significantly enhance their performance.

Why Fermentation?
Throughout history, fermentation has been an important way to preserve food and beverages, helping them last longer. It gained even greater relevance when researchers discovered the significance of good bacteria in the gut that help with basic functions such as digestion, absorption, and assimilation of nutrients. It was found that fermented food products help improve these functions, as well as helping boost general health.

Draco Fermented Botanical Extracts
Fermented botanical extracts offer synergistic benefits with the bacteria already present in the digestive tract. During fermentation, new bioactive compounds are formed, including phenolics and flavonoids, that have improved water solubility and easier absorption. The new extracts contain prebiotics in easier-to-use water soluble form, which can boost probiotic growth.

Plants are known to naturally contain polysaccharide prebiotics, which can stimulate the growth of the added probiotic bacteria. They feed the added probiotic, and along with short chain fatty acids and metabolites, also provide the microbes in the gut with a ready-to-use nutrient source.

Improved Digestion
Fermentation helps break apart tough, fibrous plant cell wall components, releasing bioactives. Phytocompounds are predigested into more water-soluble compounds by breaking the glycosidic bonds. Difficult to digest long-chain molecules like proteins are broken down into more bioavailable amino acids and peptides. Polysaccharides like beta glucans are broken down into simple sugars and easy-to-utilize lower weight sugar chains. The body's digestive system alone performs this work, but more slowly and inefficiently. Fermented botanicals improve this process.

Unique new metabolites are formed during the fermentation process, such as phenolics, flavonoids, organic acids, oligosaccharides, sugars, vitamins, and more bioavailable minerals. Some of these new metabolites have their own bioactive effects. The probiotic that is chosen may also add its own compounds to the mix. Brewer's yeast, for example, adds B vitamins and bioactive GTF chromium.

Safety
Microbiological safety and shelf life of botanicals are improved after fermentation. The growth of pathogenic bacteria is inhibited, while the added probiotics are preserved. Bacterocins present in the prebiotic also help suppress growth of harmful bacteria.
How is a fermented extract made at Draco?

1. Full Spectrum Extraction
   The first step is to perform our proprietary Full Spectrum extraction on specific herbs, fruits, or vegetables, either alone or combined as a formula.

2. Bacterial Inoculation
   The extract in liquid form is then inoculated with a pure form of the probiotic bacteria, yeast, or fungus to initially grow a seed culture, which is then added to the larger batch of extract.

3. Fermentation
   The inoculated batch of extract is held at an optimal fermentation condition for up to 7 days. Since the probiotic organisms are pure and not contaminated with pathogens, the mixture does not need to be pasteurized.

   Herbs, fruits, and vegetables generally contain more than enough prebiotic constituents that are food for the probiotics, such as inulin (fructo-oligosaccharides), pectin, and other polysaccharides to help promote probiotic bacteria/yeast growth in the fermentation process once it gets started. Near the end of fermentation, a safe low heat (50-55° C) is applied to cause probiotic cell lysis, helping release the compounds contained in the probiotic cell.

4. Spray Drying
   The fermented extract is spray dried into a fine powder. This operation is very quick, which helps preserve heat sensitive compounds, like B vitamins and antioxidants, and helps ensure that adequate levels of live probiotic bacteria will be present in the final powdered form.

5. Quality, Safety & Purity
   Extraction takes place in our state-of-the-art processing facility, which is Certified Organic to both USDA:NOP and European EEC/834 2007 guidelines. Our facilities are also ISO 9001:2015 Certified, GFSI Certified, cGMP Compliant, FSMA Compliant, HACCP Certified, Kosher and Halal Certified.

   As always, our extracts undergo rigorous analytical testing for constituent assay (HPLC, HPTLC, UV), moisture, bulk density, heavy metals (USP methods), pesticides, and microbiological plate counts. Micro safety is actually improved in fermented products as bacteriocins (natural antibiotics) are generated. We never irradiate or fumigate either our plants or finished extracts. All products are fully traceable.
Using Draco Fermented Botanical Extracts

Food Products with Enhanced Flavor Profiles
Fermented extracts may be used as nutritional, flavor enhancing food ingredients. The increase in free amino acids, nucleic acids, and peptides creates unique flavor profiles, some that have “umami” characteristics that can both promote appetite and improve assimilation of nutrients. New compounds may include cysteine, aspartic acid, guanylic acid, inosine, and glutamic acid.

Examples of existing fermented foods with enhanced taste include kimchi, miso, red yeast rice, sauerkraut, aged cheeses, aged garlic, wine, beer, seaweeds, and pickled beets. Fermented liquid or powdered yeast, mushroom extracts, and soy sauce are also widely used to enhance flavor.

Cosmetics and Personal Care Applications
Along with nutritional applications, fermented extracts are also capable of providing topical benefits for improved skin health. Research has found that the metabolites generated by probiotic activity can produce an antibiotic effect to help repel or suppress the growth of harmful skin bacteria and fungi. With the added inhibitory bacteriocins from fermentation, the reinforced extracts can also help strengthen the skin’s immune defenses, reducing skin sensitivity and improving moisture retention.

Draco uses fermentation technology to develop clean, natural ingredients for cosmetic and personal care products – for example, a certified organic glycerin from organic corn using a living cell derived process. Lipoteichoic acid, a metabolite from L. plantarum, has anti-photoaging effects by regulating MMP-1 (collagenase). The extract of Bifido longum improves sensitive skin and increases skin resistance against physical and chemical aggression. Metabolites from Lactobacillus johnsonii relieve inflammatory skin problems such as atopic dermatitis. Other skin care applications of high bioavailability actives are use of those with anti-aging, skin whitening, anti-inflammation, moisturizing, and UV-blocking effects.

Customization
Draco can customize fermented product blends based on your individual needs. Our team can focus Traditional Chinese Medicine formulas on various health indications, including immune support, digestive health, sleep and relaxation, and weight loss. We can also customize a formula based on food recipes, such as fruit, vegetable, and mushroom blends for either food or health applications.

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but also high-value compounds for human nutrition, such as beta-carotene, phycocyanin, astaxanthin, EPA (eicosapentaenoic acid), and DHA (docosahexaenoic acid).

While algae, particularly seaweeds, have a long history of use in Asian cultures for helping to address everything from inflammation, immunity, and gut health to oncology, the ability to extract and isolate specific fractions of algae has given these ingredients greater use worldwide, says Helen Fitton, PhD, chief scientist for Marinova (Cambridge, Tasmania, Australia). “The interest in seaweed-derived ingredients has significantly grown in recent years—not just in Asia but in western countries, too—as research continues to reveal the extraordinary health potential they offer.”

**Health Benefits**

Modern-day clinical research substantiating the human health benefits of a number of algal strains continues to grow. “There are endless species of algae, and each has unique constituents” for supporting health, says Algalif’s Stefánsson.

Immune health has long been an area of interest where algae are concerned. Marinova’s Fitton points to a study done on fucoidan. Marinova specializes in this high-purity compound, which it extracts from two species of fucoidan-rich, certified-organic macroalgae: Undaria pinnatifida and Fucus vesiculosus. Fucoidan, she explains, plays an essential role in helping seaweed protect itself from marine pathogens.

A published human study sponsored by Marinova on its Maritech branded fucoidan exploring the ingredient’s immunomodulatory potential found that the study’s fucoidan-supplemented subjects saw a significant increase in cytotoxic T-cell numbers and phagocytic capacity in monocytes, as well as a significant decrease in levels of the inflammatory cytokine interleukin 6, leading researchers to conclude that the fucoidan does have “potential as an immune modulator.”

Ingredient supplier Kemin (Des Moines, IA) has brought to market a new immune-health ingredient called BetaVia, derived from the algal strain Euglena gracilis. The company recently announced the results of a 90-day double-blind, placebo-controlled human clinical trial on BetaVia Complete, which is a whole-cell algae ingredient grown via fermentation and comprising more than 50% algae-sourced beta-glucans, plus protein, amino acids, and essential vitamins and minerals. The study found that compared to subjects taking a placebo, BetaVia Complete subjects experienced 70% fewer upper respiratory tract infection (URTI) symptoms, 3.3 fewer sick days, and 10 fewer URTI symptoms throughout the study. The study is currently awaiting publication. (The company also offers BetaVia Pure, a concentrated Euglena gracilis ingredient containing more than 95% algal-sourced beta-glucans.)

Josh Swalla, product manager for active wellness at Kemin Human Nutrition and Health, says, “We believe the immune supplement market is ripe with opportunity for algae. The overall immune [supplement] market is estimated to reach $25 billion in retail sales by 2025, according to Persistence Market Research. Providing customers with an immune-health ingredient from a unique algae source will allow their products to stand out on shelves.”

Another ingredient, InSea2, which is derived from the seaweed species Ascophyllum nodosum and Fucus vesiculosus, was shown in a newly published six-month randomized, double-blind, placebo-controlled study on 65 dysglycemic patients to be effective for glycemic control compared to placebo. Researchers
observed that subjects taking the ingredient saw significant reductions in levels of glycated hemoglobin, fasting plasma glucose, postprandial glucose, and insulin-resistance index compared with placebo. The ingredient, combined with chromium picolinate, helped 18.2% of patients return to normal glycemic status after six months, compared to zero in the placebo group.

Sports nutrition is also a growing market. At the Natural Products Expo West trade show in March, Lonza Consumer Health & Nutrition (Morristown, NJ) introduced a new marine phytoplankton-based ingredient derived from *Tetraselmis chuii* that increases physiological response to oxidative stress, supporting physical performance and recovery. The ingredient, brand name Oceanix, is said to be rich in antioxidant enzymes, including superoxide dismutase (SOD), as well as essential fatty acids, vitamins, amino acids, and minerals.

“Oceanix marine phytoplankton is developed using a patent-pending process in a food cGMP facility and is cultivated on non-arable land using recycled water, helping to meet the rising demand for more sustainable, naturally derived dietary supplement products,” says Cliff Barone, global ingredient marketing, Lonza Consumer Health & Nutrition. “The Oceanix brand also meets the growing need for nutritional support for active consumers—whether weekend warriors or elite athletes—and the demand for clean-label, vegetarian products. Active consumers want active nutrition products to support performance and recovery that’s also clean-label and non-GMO, and with its vegetarian origins, the Oceanix ingredient helps to bring sports performance and wellness benefits together, appealing to a new set of consumers.”

Barone says that Oceanix has been the subject of a pilot study on 32 student athletes, which found that 25 mg of the ingredient daily significantly improved multiple biomarkers of exercise performance and recovery compared to baseline and control. “This may be attributable to the high concentration of SOD that sets Oceanix marine phytoplankton apart from other microalgae ingredients,” he says.

He adds: “Phytoplankton ingredients are gaining traction in the dietary supplements space thanks to their natural, non-GMO, and plant-based source of nutrition. This comes as consumers become increasingly informed about the products they consume, which is driving the demand for more naturally sourced products.” Oceanix is suited for various sports nutrition applications, including dietary supplements, bars, drinks, and powders.

**Astaxanthin**

Apostixanthin, the natural carotenoid derived from *Haematococcus pluvialis*, has carved out a special market for itself in the algal ingredients space. Says Algalife’s Stefánsson, “Astaxanthin protects against free radical damage; preserves healthy lipids, proteins, and DNA; and helps the human body maintain a healthy oxidative balance. As science continues to demonstrate the numerous benefits of astaxanthin, opportunities are growing in markets from beauty and self-care to sports nutrition and healthy aging.”

Skin health is one area of research interest. Last year, Algatech announced a new study done on a branded supplement from Fujifilm containing Algatech’s natural astaxanthin, derived from *Haematococcus pluvialis*. Study subjects were given the oral supplements, after which skin was irradiated in order to measure any skin changes. Nine weeks of daily astaxanthin intake resulted in a higher amount of UV exposure required to visibly redden the skin, leading the researchers to conclude that “astaxanthin seems protective against UV-induced skin deterioration and helps maintain healthy skin in healthy people.”

“Astaxanthin will not and should not replace a sunscreen cream, but it provides another layer of protection,” says Algatech’s Gottlib.

Gottlib adds: “Natural algal-sourced astaxanthin is gaining popularity thanks to the expanding evidence and clinical studies supporting its health benefits and its key role in preventing health disorders, especially those associated with inflammation and oxidative stress conditions, as well as its support of mitochondria activity and function. There is strong clinical evidence for its support of eye health, cognition, skin health, cardiovascular health, and muscle endurance and recovery.”

Last fall, astaxanthin supplier AstaReal (Nacka, Sweden) announced a new four-
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*These statements have not been evaluated by the Food and Drug Administration. This product is not intended to diagnose, treat, cure, or prevent any disease.
A month study funded by the company’s retail brand Astavita showing that a supplement containing AstaReal natural astaxanthin, along with tocotrienol and zinc, both increased endurance and significantly improved muscle function loss in sarcopenia sufferers. (Sarcopenia is the loss of muscle mass that occurs due to aging.)

“The results of this study are incredibly exciting as they show that AstaReal can play a vital role in supporting muscle endurance, strength, and mobility, thus combatting the effects of debilitating conditions such as sarcopenia,” said Andie Long, sales and marketing manager, AstaReal Sweden, in a press release.

Meanwhile, AlgaeHealth’s Capelli points to brand new study on his company’s AstaZine astaxanthin, which he says is “the first of its kind.” The study, funded by AlgaeHealth, examined the effects of AstaZine astaxanthin on depression and fatigue in human subjects. The researchers found that supplemented subjects saw significant improvements in positive mood state parameters such as global mood and vigor, and in negative mood state parameters, including depression, fatigue, confusion, tension, and anger. Wrote the researchers: “While previous studies have shown [natural astaxanthin] supplementation to improve parameters associated with brain health (neuro-inflammation and cognition), these data are the first to suggest that natural astaxanthin supplementation reduces negative mood state parameters (depression and fatigue) and improves global mood state and thus supports mental wellness.”

Capelli says: “It’s preliminary to make conclusions based on this one study, but the potential implications for people on prescription antidepressants is very interesting.”

Promises such as these are what keep astaxanthin suppliers looking forward.

Algatech’s Gottlib says, “Globally, the demand for astaxanthin is expected to continue to grow at a fast pace in the years to come. Natural algal sources of astaxanthin could be called the ‘king’ of carotenoids, with studies showing it to be 500 times more effective than tocopherol vitamin E and possessing proven clinical advantages.”

“We also see more and more countries have started to seek out the benefits of astaxanthin,” he adds. “We expect that, the same as with other valuable health ingredients, astaxanthin will gain an even bigger role in the functional food industry.”

Capelli says: “The astaxanthin market has been tumultuous over the last decade, with demand growing very rapidly when many huge opinion leaders tried it, felt the benefits for themselves, then went on ‘The Dr. Oz Show’ and ‘The Oprah Winfrey Show’ and wrote The New York Times number-one-bestselling books extolling its benefits. Now, you can find it in many products outside its traditional supplement market, but supplements still comprise the large majority of the volume.”

Capelli says that following a large spike in demand for astaxanthin in 2011-2014, demand has continued to rise, “but at more reasonable levels.” He says: “We still have a long way to go in our goal to make astaxanthin a household word. Even though there’s been a lot of publicity about it over the last decade, most consumers still don’t know what it is, so there’s a lot of room for innovative brands to grow the market.”

Astaxanthin ingredient suppliers are working hard to ensure their ingredients can accommodate many types of product forms and consumer requests so that manufacturers can innovate further with astaxanthin.
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Last fall, AlgaeHealth introduced a new water-dispersible emulsion of its AstaZine natural astaxanthin especially for beverages. According to the company, this new format utilizes a trademarked technology called Dispersa that “resolves two key complications common in competitive ‘water dispersible’ astaxanthin products: ineffective dispersion in water applications and residual staining of consumers’ mouths and packaging containers.” (Astaxanthin is known for its bright red color, which is often used as a colorant.) “We’ve seen competitive products claiming to be water dispersible which have sedimentation and suspended particles after mixing,” added Lixin Ding, PhD, general manager of BGG North America, AlgaeHealth’s parent company, in a press release. “Astaxanthin using Dispersa technology is completely transparent and stable over time, with no aggregation, sedimentation, or suspension of astaxanthin.” BGG says it plans to apply Dispersa to other ingredients in its line.

Algatech recently released a whole-algae powder form of its AstaPure astaxanthin—called AstaPure Arava powder—that it says meets consumer demands for a clean-label, vegan, organic, whole-food ingredient. The whole-algae powder brings “consumers the full array of benefits from the H. pluvialis algae cells as polysaccharide complex, proteins, minerals, essential fatty acids, as well as astaxanthin.” Gottlib says this kind of an ingredient meets consumer demands for “less-processed food—in the case of astaxanthin, meaning consuming it exactly as nature created it.”

Source Is Important

Marketers interested in taking advantage of the benefits of algal ingredients should keep in mind that source material is important.

For instance, says AlgaeHealth’s Capelli, “The source of astaxanthin is a key consideration, since forms other than algae-based have been shown in several peer-reviewed studies to be far inferior in efficacy. As an example, algae-based astaxanthin is 20 to 90 times stronger as an antioxidant than synthetic astaxanthin produced from petro-chemicals. And about half a dozen studies have shown how yeast-based and synthetic forms don’t deliver the health benefits that algae-based astaxanthin does in a variety of applications.” (Capelli was the co-author of a paper published in 2013 exploring this topic.)

Algalife’s Stefánsson points out: “As the consumer trend towards natural, functional ingredients continues to grow, not only is the demand for algae ingredients growing, but specifically those that have proven sustainability, quality, and traceability behind them. Microalgae cultivated under controlled conditions in locations that can provide clean energy and water inputs address these demands particularly well.” Instead of cultivating algae in open ponds, for instance, Algalife utilizes a LED-illuminated indoor photobioreactor system and a three-phase cultivation process to produce the Haematococcus pluvialis used to extract its Astリアル astaxanthin ingredients. The company says this process allows it to control all production parameters and prevent the presence of any contaminants. “The productivity in such a system is much higher than in open-pond systems, as the light utilization is better, evaporation is lower, and the systems can run on maximum productivity 24/7,” Stefánsson adds.

Kemin is another company using a patented fermentation process that enables the company to produce BetaVia ingredients under controlled conditions.

Warming Up

Slowly, consumers here at home are coming around to all that algae offers. “Marine-derived ingredients have been popular in Asian markets for years, but they are just beginning to gain traction in North America,” says Kemin’s Josh Swalla. “With many consumers switching to a plant-based diet, marine ingredients such as algae are becoming more accepted. The wide acceptance of spirulina shows that North American consumers are willing to try marine ingredients.”

There’s no doubt that algal ingredients will continue attracting attention in the human health market as algae becomes a popular topic all around. “Interest in algae-based
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Marine Ingredients

“Many algae species have adapted to become extremely potent nutritionally,” says AlgaeHealth’s Bob Capelli.

Marine Ingredients has increased over the last decade for two reasons: a lot more research has emerged showing health benefits for several species of algae. In addition, there has been increased focus by some huge companies on algae for other potential uses, such as energy, which has spilled over into interest in its other benefits,” says AlgaeHealth’s Capelli. “When you’ve got Exxon Mobil running television ads about the potential to produce fuel from algae, it’s certain to increase interest in its other uses.”

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Marine oils, such as fish and krill oil, are not the easiest to encapsulate for a major reason: they are prone to oxidation. By the end of a product’s shelf life, this oxidation can result in a product of poor quality and taste. The goal for softgel manufacturers when handling these marine oils is to minimize oxidation at all costs. Softgel suppliers discuss their strategies for handling these tricky ingredients.

“The molecular structure of the two most popular long-chain polyunsaturated omega-3 fatty acids, EPA and DHA, makes them prone to oxidizing easily, and it’s this oxidation that is a large concern to users,” explains Steve Holtby, president and CEO of Soft Gel Technologies Inc. (Los Angeles). “High oxidation can cause unpleasant repeating (fish burps) and can make the oil smell and taste rancid.” Not only that, but oxidation can lower the product’s overall health efficacy and actually render the product unhealthy by producing pro-inflammatory free radicals.

To avoid these problems, softgel manufacturers often seek to manufacture in an oxygen-free environment and at low temperatures. But a high-quality process starts much earlier than that, says Paul Hwang, vice president of quality and regulatory from Captek Softgel International (Cerritos, CA); it involves everything from vendor selection and qualification to material receipt, sampling, warehousing, and more.

“We are acutely aware of marine oils’ characteristics; thus, we have designed tight process controls and systems that ensure we partner with a fish oil supplier who safeguards and consistently delivers the freshest oil to limit the initiation of the oils’ autooxidation,” says Hwang from Captek. From there, the company follows a strict and careful vetting process, including when sampling and handling the oil once received, inspecting the incoming oil, and warehousing. “In the processing of these oils, our Master Manufacturing Records detail specific control parameters and steps to ensure minimal exposure of these oils to, and control against, autooxidation agents and propagation of the oils’ oxidation,” says Hwang.

Soft Gel’s Holtby agrees that these steps are key to a product’s success, including working with high-quality suppliers whose raw materials have low oxidation levels to start with—for instance, ensuring that you’re using a supplier used to supplying ingredients for supplement production and not just supplying byproducts of the fishing industry. The company also warns industry to be on the lookout for manufacturers who will purchase and import fish oil softgels and “re-package” these softgels as domestically produced products. Asking all manufacturers for a batch-specific Certificate of Analysis can help to sidestep fraud.

From there, quality is in the manufacturer’s hands—something Holtby says his company is well-equipped to handle. “The fish oils encapsulated by Soft Gel Technologies Inc. are molecularly distilled, meet stringent standards, and contain natural antioxidants (d-alpha-tocopherol) to prevent rancidity,” he says.
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“We also test peroxide values and take great care during manufacturing to ensure the oil is protected from oxidation. We limit exposure by pulling vacuum and/or nitrogen blanketing during blending,” And, Holtby says, “Limiting batch sizes to only those that use full drums can help prevent earlier exposure, even when using nitrogen blanketing to limit that initial exposure.” Fats are removed from the oil, and molecular distillation is used to remove heavy metals and other toxins.

Softgel materials themselves can also help to improve the user experience. For instance, says Timothy Chiprich, vice president of product development for Captek Softgel, his company has developed specific formulations for its capsule shells that ensure the capsules resist becoming brittle and leaking “like regular softgels do.” Namely, says Chiprich, the higher the content of long-chain polyunsaturated fatty acids in an oil, the more sensitive the oil will be to oxidation, and the faster oxidation will happen.

Chiprich also points out that krill oil can be even more difficult to encapsulate because its omega-3 fatty acids are “bound to water-dispersible phospholipids rather than water insoluble triglycerides like the omega-3 fatty acids in most fish oils. The phospholipids’ attraction to water tends to affect the softgel shell, making it brittle and prone to leaking over time due to water migration from the softgel shell into the phospholipids in the fill.”

Last fall, Marinova (Cambridge, Tasmania, Australia), a supplier of seaweed extract ingredients, announced a novel way to use its fucoidan ingredient to help better microencapsulate fish oils by reducing oxidation. In a press release, the company described it as a “two-step microencapsulation system with a ‘double shell’ structure using a bioactive seaweed polysaccharide, known as fucoidan.” (The technology was developed by university researchers.) By including fucoidan in the shell material at 7%, researchers were able to “significantly improve oxidative stability of the encapsulated oil and induce better crosslinking of the shell material,” said the company.

“The polyphenols present in the fucoidan extract crosslink to form a tight network of chains with gelatin, which provides this powerful stability,” explained Colin Barrow, a researcher from the Deakin University’s School of Life and Environmental Sciences, who led the team who made the discovery. The researchers wrote about their discovery in the journal Powder Technology last year.

Reference
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Brain health supplements have rapidly gained popularity among the academic and professional communities alike, with everyone on the lookout for new ingredients that will improve focus, boost critical thinking skills, shorten reaction time, and extend mental endurance. As the world of work continues to shift toward mental rather than physical tasks, cognitive performance in school and the workplace will only become more critical to the everyday lives of mainstream consumers.

Supplement manufacturers and brands looking to capitalize on emerging markets will want to watch the cognitive performance space closely in the coming years as more research validates the benefits of cognitive performance ingredients and consumer interest snowballs. If past is prelude and general nutritional supplement trends hold true, then the growth of the cognitive health market will lead consumers to demand more research to back up the claims of brands and manufacturers. Here’s what the latest research shows about five of the market’s fastest-growing cognitive performance ingredients.

**Spearmint Extract Improves Cognitive Performance in Elite Military Forces**

Spearmint extract has undergone several studies for its cognitive performance properties in the last few years. Most recently, researchers in Israel working under the supervision of Israel Defense Forces Medical Corp Cardiothoracic Surgeon Commander Col. Ishay Ostfeld, MD, studied the effects of Kemin’s (Des Moines, IA) branded spearmint extract supplement Neumentix on 10 special operations counterterrorism specialists during a live military tactical operation.

The randomized, double-blind, parallel-design clinical trial followed these specialists during an operation after a 24-hour period of sleep deprivation. Participants were randomly assigned to receive either 900 mg/day of Neumentix (n=5) or a matching placebo (n=5) for 17 days. All participants underwent tests of physical, cognitive, and executive functioning before Neumentix supplementation and one hour after the conclusion of the military operation.

Five out of five subjects in the experimental condition correctly identified the target within one hour of the operation’s conclusion, compared to only three out of five subjects in the control condition. While the study authors caution that these results are not conclusive evidence that spearmint extract is an effective cognitive supplement, and the small sample size limits the generalizability of the findings, Kim Colletti, Kemin’s global product manager, brain health platform, says that the trial is noteworthy nonetheless: “This study was a well-designed clinical trial, and while the small sample size means the findings are mostly suggestive, this was a one-of-a-kind experimental situation that we believe adds...
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to the body of evidence for Neumentix. [The study also found that] Neumentix may improve subjective feelings of energy and alertness when stressed.”

**Low Magnesium Intake Correlated with Alzheimer’s Disease, Memory Disruptions**

An oft-overlooked mineral, magnesium appears to have a critical function in both fueling cognitive processes and protecting the brain from age-related decline. One literature review found that higher consumption of magnesium oxide was correlated with lower reported incidences of dementia, while an earlier systematic review found that patients diagnosed with Alzheimer’s disease had significantly lower concentrations of magnesium in their cerebrospinal fluid than healthy adults.3

Stephen Ashmead, senior fellow, mineral chelates, at Balchem (New Hampton, NY), says that the role of magnesium in the brain is critical yet poorly understood. Magnesium is known to be involved in memory, he says, as well as energy production. “The brain represents about 2% of total body weight in an average human, yet it consumes 20% of the total energy the body produces,” Ashmead says. “We know that magnesium is critical to the production of energy in the body. It bonds to ATP to create the biologically active form of ATP (Mg-ATP), and it is essential to the activity of many of the enzymes in the energy production cycle. But magnesium may also have other roles in the brain, and we don’t yet fully understand how magnesium works, outside of energy production, but we do have indications that it may play a significant role.”

Memory and energy production are critical functions involved in thought itself, meaning magnesium may well be involved in more cognitive processes than previously thought. Further research is needed to determine which other areas of cognition involve magnesium and the specific role magnesium plays in said processes.

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**BOOSTING THE BRAIN THROUGH RELAXATION**

Research is now showing that stress is very literally making consumers less intelligent. One community-based study of 467 African-American senior citizens with a mean age of 73 assessed the impact of stress on cognitive function. Higher perceived stress was correlated with faster declines in global cognition, particularly visuospatial reasoning skills and episodic memory.

In layman’s terms: Stress makes people dumber. As busy professionals look for a leg up in the workplace, expect relaxation and focus-oriented ingredients like ashwagandha to gain popularity in the cognitive health market.

**Citicoline Gains Popularity in E-Sports**

The e-sports industry has only continued to grow in recent years, with major competitions taking place in countries all around the world. The global e-sports market is estimated to be worth over $906 million per year, according to a market report by NewZoo. With major gaming events around the world attracting highly competitive professional gamers who compete for millions in prize money, cognitive health supplements are already in high demand among gamers.

It should come as no surprise that sports and e-sports players are going to unconventional means in order to secure even the slightest edge. Elyse Lovett, senior marketing manager for Kyowa Hakko USA (New York City, NY), says that the sports industry in general and e-sports in particular are both fueling interest in citicoline.

“Sports nutrition has been added to the cognitive health category for ingredient effects like focus, attention, and mental energy,” Lovett says. “But even more recently, we’re seeing a boom in interest in the e-sports category. The professional gaming community, a multibillion-dollar industry, is starting to recognize the benefits of cognitive health ingredients, especially those that could improve their game. Gamers are looking at products that boost focus and mental energy.”

One such gaming-specific product is Liquid Luck (Vista, CA), a finished-product cognitive health supplement for gamers that contains Kyowa Hakko’s Cognizin-brand citicoline in addition to ashwagandha, antioxidants, and a branded *Astragalus membranaceus/Panax notoginseng* blend called AstraGin from NuLiv Science (Brea, CA).

Kyowa Hakko recently exhibited its branded Cognizin supplement in March at the South by Southwest (SxSW) Gaming Expo in Austin, TX. The SxSW Gaming Expo, now in its 13th year, attracts tens of thousands of attendees every year and features multiple tournaments involving PC, arcade, console, and tabletop games. SxSW tournaments also tend to offer significant cash rewards to winning players, including a $100,000 prize pool for players of the Halo game series. With such large sums of prize money up for grabs, even the slightest mental edge could result in a very substantial payday, making cognitive health supplements a wise investment for professional gamers.

**PQQ Improves Spatial Awareness and Promotes Neuronal Health**

Cognitive health supplements find easy adoption among biohackers, but more conservative or traditional consumers who are a little more cautious and skeptical may not be as likely to try new ingredients—unless that ingredient is PQQ. Even the hardest-to-reach consumer is familiar with vitamins, and that’s where PQQ may boast an appeal that other cognitive health supplements don’t have.
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“PQQ is the first new vitamin discovered since 1948,” says Dan Lifton, president of Maypro Ventures (Purchase, NY). “It was found to exist in human tissues and bodily fluids in 1992, and in 2003, PQQ was shown to be an essential co-factor in important enzyme-catalyzed reduction-oxidation reactions.”

Recent research is indicating that PQQ plays an important role in preventing—or even reversing—age-related cognitive decline. Other studies have shown that PQQ improves brain functions like memory, attention, information processing, and spatial awareness.

One double-blind, placebo-controlled parallel-group study followed 71 healthy adults between the ages of 45 and 65 who did not show signs of dementia. Participants were randomly assigned to receive a food supplement containing 20 mg of PQQ, 20 mg of PQQ plus 300 mg of CoQ10, or a placebo, once daily for 12 weeks. Participants were assessed using word memorization tests, recall tests, mental stress tests, measures of oxidative stress, the Stroop test, and the CogHealth test at baseline, week 4, week 8, and week 12.

The study authors found that while both the PQQ and PQQ/CoQ10 groups performed significantly better on word memorization and recall tests relative to the placebo group, only the PQQ/CoQ10 group saw a statistically significant improvement on Stroop test scores. Both the PQQ and PQQ/CoQ10 groups performed better on the CogHealth test than the placebo group; however, the PQQ/CoQ10 group saw a more significant improvement on certain components of the CogHealth test that the PQQ group did not see.

Materials provided to Nutritional Outlook by Mitsubishi Gas Chemical (Tokyo, Japan), supplier of the BioPQQ ingredient, explain that PQQ activates mitochondrial biogenesis and boosts Nerve Growth Factor, thereby increasing the amount of energy in brain mitochondria and promoting neuronal development and health. Mitsubishi Gas Chemical notes that PQQ’s functional benefits include improved short-term memory, improved sleep, reduced stress levels, and increased word recall.

Ongoing research into a variety of cognitive health supplements has shown clear benefits for focus, memory, alertness, and spatial awareness.

FDA CRACKING DOWN ON OUTLAW COGNITIVE HEALTH PRODUCTS

As consumer interest in cognitive health supplements continues to grow, the market is ripe for abuse by unethical individuals who promote and sell illegal products. Most recently, in February 2019, the FDA sent formal warnings to 17 companies who were illegally selling unapproved drugs as dietary supplements that the companies illegally claimed could treat Alzheimer’s disease.

Omega-3s Improve Brain Function in Adults with Mild Cognitive Impairment

Omega-3 fatty acids have long been known to have beneficial effects on brain health. But now, advanced research methods are even further validating the body of research around omega-3s and creating additional context around their effects on the brain. Bill Harris, PhD, president of OmegaQuant (Sioux Falls, SD), an omega-3 test kit company, says that recent studies on omega-3 fatty acids have found that these compounds may have gender-dependent effects.

Harris references a six-month double-blind randomized controlled trial involving 86 Chinese men and women over 60 years of age who suffered from mild cognitive impairment but who were otherwise healthy. Participants received either four 1-g
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As the nature of work continues to transition toward knowledge-based industries, expect consumers of all ages to turn to cognitive health supplements.

soft-gelatine omega-3 capsules per day for nine days (n=44) or a placebo made from olive oil (n=42). Participants were assessed at baseline and after six months on the Chinese Academy of Sciences’ Basic Cognitive Aptitude Test (BCAT), which measured perceptual speed, mental arithmetic efficiency, space imagery efficiency, working memory, and recognition memory. Participants also had blood samples taken at baseline and after six months.

The study found that intake of omega-3 fatty acids resulted in a statistically significant improvement on the BCAT test (p < 0.0001), with improvements in perceptual speed, working memory, and spatial imagery efficiency after six months (p <0.05). The study authors note, however, that there was no difference between groups on scores of mental arithmetic efficiency and recognition memory.

Says Harris: "The study authors found significant benefits on certain components of a battery of cognitive tests. But some benefits were only seen in women, and others were only seen in men, indicating a gendered effect."

Cognitive Health Concerns on the Rise

Ongoing research into a variety of cognitive health supplements has shown clear benefits for focus, memory, alertness, and spatial awareness. Consumer demand for such supplements is only going to grow over time. As the nature of work continues to transition toward knowledge-based industries, and as large numbers of Americans start to enter their retirement years, expect consumers of all ages to turn to cognitive health supplements that are backed by well-designed studies.

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Major Brands Double Down on Neuro-Nutrition

On March 6, 2019, Trident Brands (Brookfield, WI) and CVS Health (Woonsocket, RI) announced a partnership that will see Trident's branded Brain Armor neuro-nutrition supplement stocked in CVS locations all around the United States. While Trident has historically positioned Brain Armor as a sports nutrition supplement, the brand is now expanding its Brain Armor line of products to cater to mainstream consumers at multiple stages of life. This partnership between a major consumer brand and a national pharmacy chain indicate that these large players are expecting to see extensive growth in the cognitive health market in the near future.

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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Nootropic substances for enhanced cognition are all the buzz these days, appealing to a vast audience, from the individual looking to ward off age-related cognitive decline to the executive looking to maintain his or her mental edge at work or the e-gamer looking to outsmart and outwit the competition. Dietary supplements are an increasingly important part of the hunt for improved cognitive function, with some estimates suggesting that the global market for brain health supplements—which, according to Research and Markets, saw estimated sales of $2.3 billion in 2015—will rise to over $11 billion by the year 2024.¹

Numerous botanical extracts are demonstrating ability to serve as part of the nootropic toolbox, whether one is interested in enhancing memory, attention, processing speed, or mood, or supporting other factors contributing to brain health. While herbs such as rhodiola (Rhodiola rosea), bacopa (Bacopa monnieri), and Ginkgo biloba have a long history of traditional use for brain health, research is now finding that several other botanicals are increasingly important players for improving cognitive health and helping to maintain that mental edge.

**Boswellia and Lemon Balm Support Memory**

Two herbs used to support cognitive health in traditional medicine, including in Iranian herbal medicine, are *Boswellia serrata* and *Melissa officinalis* (lemon balm). While these herbs have often been studied as individual ingredients, less research has been conducted on the combination of the two.
In a recent double-blind placebo-controlled trial, Mohsen Taghizadeh and colleagues from Kashan University of Medical Sciences (Kashan, Iran) investigated the effect of the herbal combination on memory function in older adults.\(^2\)

Seventy adults with an average age of 65 were randomized to receive either placebo tablets or two tablets containing the boswellia/lemon balm combination (290 mg of a standardized extract of *Melissa officinalis* and 27 mg of standardized *Boswellia serrata* extract per tablet) daily for one month. Cognitive assessment was conducted using the Wechsler Memory Scale-Revised version, which includes eight primary indices looking at verbal, general, visual, and working memory.

At the end of the study, significant improvements versus placebo were evident in verbal and visual memory in those taking the herbal combination. Furthermore, a significant increase was seen in immediate, working, and total memory scores in the boswellia/lemon balm group compared to placebo treatment, indicating significant cognitive benefits of this herbal combination in elderly individuals.

**Mushrooms Enhance Executive Function**

Mushrooms have been used medicinally in traditional cultures for millennia, including in traditional Chinese medicine. Polysaccharides from *Tremella fuciformis*, sometimes referred to as snow fungus or white jelly mushroom, have been found to have promising neuroplastic effects in earlier studies, leading to the idea that they can play a role in supporting brain health. Soonhyun Ban and colleagues from Ewha Womans University in Seoul (Seoul, Korea) conducted a randomized, placebo-controlled trial to assess the effects of *Tremella* on improvement of cognitive function.\(^3\)

In the study, 75 individuals aged 40-65 with subjective cognitive decline were randomized to placebo, 600 mg, or 1200 mg of *Tremella fuciformis* extract daily for eight weeks. The primary outcome was change in the Subjective Memory Complaints Questionnaire (SMCQ), a validated measure assessing memory function. Secondary outcomes included changes in short-term memory or executive function assessed using the Cambridge Neuropsychological Test Automated Battery (CANTAB) and Wisconsin Card Sorting test (WCST), respectively.

After eight weeks, improvement on the SMCQ was significantly greater in both the low- and high-dose *Tremella* groups versus placebo. Short-term memory performance also improved significantly in both treatment arms versus placebo, while executive function significantly improved in the high-dose *Tremella* group. Significant increases in gray matter volume in various areas of the brain were evident in both treatment groups. These results indicate that *Tremella* led to significant improvements in cognitive performance and memory function in individuals with subjective cognitive decline.

**Ashwagandha: Adaptogen for Brain Function**

A botanical often used in the Ayurvedic tradition as a tonic herb or adaptogen is ashwagandha. Among its many uses is its ability to promote cognitive and brain health. A recent study led by researchers at the Department of Pharmaceutical Technology, NSHM Knowledge Campus (Kolkata, India) aimed to determine the benefit of ashwagandha supplementation for improving memory and cognitive function in adults with mild cognitive impairment.\(^4\)

In the double-blind, placebo-controlled study, 50 adults were randomized to supplementation with a placebo or 300 mg twice/day of an ashwagandha root extract (KSM-66; Ixoreal Biomed Inc. (Los Angeles, CA)) for eight weeks. The Wechsler Memory Scale was used along with several other measures of cognitive function, including the Eriksen...
Brain Health

flanker task test, Wisconsin Card Sorting test, Trail Making test, and the Mackworth Clock task test.

The group taking the ashwagandha extract demonstrated significant improvements in both immediate and general memory versus placebo as well as significantly greater improvements in executive function, attention, and information processing speed. The results of this pilot study support the ability of ashwagandha extract to effectively enhance several aspects of memory and cognitive health.

Green Coffee Promotes Cognition

Coffee has been in the news lately as research continues to point to health benefits associated with its consumption. While caffeine is a well-known component associated with energy enhancement and cognitive benefits, research attention is shifting to other healthy compounds in coffee, including chlorogenic acids. These polyphenols are abundant in coffee, specifically in unroasted green coffee beans, and have shown promising health effects of their own as they have powerful antioxidant activity. Recently, Katuyoshi Saitou and colleagues from Kao Corporation (Tokyo, Japan) sought to investigate the effects of chlorogenic acids on cognitive function.5

In the randomized, double-blind, placebo-controlled study, 38 healthy adults aged 50-69 experiencing subjective memory complaints were asked to consume a caffeine-free beverage containing 300 mg of chlorogenic acids per day or a placebo beverage for 16 weeks. The researchers assessed cognitive function using the CNS Vital Signs battery, which is composed of seven tests assessing parameters of memory, attention, and other cognitive aspects. The group consuming the chlorogenic acids-enriched beverage showed significant increases in scores for motor speed, psychomotor speed, attention, and executive function compared to the placebo group, indicating that these compounds from green coffee may have significant benefits for brain and cognitive health.

Reference


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

Green coffee

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As more wellness products enter an already crowded market in 2019, packaging remains paramount to marketing and branding efforts. Indeed, with packaging of these products continually evolving in a highly competitive atmosphere, one would be forgiven for wondering if there is anything new under the sun.

It seems that the answer is yes, there is, and the more wildly different and potentially disruptive, the better. “I believe what brands are looking for and what they need are two different things this year,” says Kevin Smith of Smashbrand, a packaging design and branding agency serving the natural products industry. He explains: “We get several calls a day with brands looking to refresh with the same on-trend, millennial-friendly buzzwords, such as healthy, sustainable, trustworthy, clean, and the like. I believe we are hitting a saturation point on-shelf, where too many brands look alike.” This sameness, he says, creates confusion and hesitation on the part of the consumer. To drive home his point, he wryly asks, “Have you seen a kombucha section lately?”

David Lemley, president and head of strategy at brand-strategy firm Retail Voodoo, agrees that products must use packaging to “stand out,” while also balancing that goal with category convention. “The package is often the first and only salesperson for a health food and for functional foods and beverages,” he says. “In each case, the packaging needs to work hard to deliver brand beyond functional features and benefits while simultaneously clearly communicating those attributes.” (See the photo above of packaging for Wedderspoon, which is a Retail Voodoo client.)

Gaia Herbs Director of Brand Experience, Frederic Terral, who was involved in a recent rebranding of Gaia Herbs products, adds that successful packaging-design execution for natural products “encompasses deliberate and calculated typography choices and rich or unique colors,” and displays a “general sensitivity to purposeful compositions.”

To “intimately control” the company’s brand messaging, Gaia has created an in-house agency called The Hive to align its “verbal and visual identity” with its culture, mission, vision, values, and persona. Via The Hive, Terral says, “We know our people, we know our customers, and we know best how to express our brand in the most sincere and genuine manner.”

How to Stand Out?

“It’s a tough market out there,” says Smashbrand’s Smith. “Nine out of ten new health and nutrition consumer products will fail within the first year. Usually, this has nothing to do with the product itself, only how it’s presented.” He reiterates that the majority of all first-contact and purchasing decisions are made “at the shelf” in retail locations. And for brands following distribution models, packaging is “the most critical marketing asset they have.”

2019 is the year brands “have a significant opportunity to be disruptive on the
When Wedderspoon embarked on a rebrand for its number-one-selling Manuka Honey brand in North America, it wanted to emphasize how the brand stands out in the market. David Lemley, founder and chief strategist for design firm Retail Voodoo, said in a press release:

“We helped Wedderspoon clearly communicate that they are the only brand to take a stand for 100% raw non-GMO Manuka products.”

New product lines were established to emphasize the products’ benefits while also making the brand look cohesive.

TAKING RECYCLABILITY TO THE NEXT LEVEL

VitaFusion announced last year that it is the first vitamin brand to convert to recycle-friendly shrink packaging in the United States. Its MultiVites 150-count gummies bottle was already recyclable, but the seamed, shrink-wrapped label wasn’t. Beginning last year, however, packaging for VitaFusion MultiVites 150-count gummies now incorporates shrink labels made with Eastman Embrace LV resin and Sun Chemical’s SunLam Deseaming adhesive—a move that converts a previously only partially recyclable gummies package to a fully recyclable one.

“We are committed to making a positive impact on the environment,” a VitaFusion spokesperson said in an e-mail message to Nutritional Outlook. “Our partnership with The Fruit Tree Planting Foundation to plant up to 200,000 fruit trees by the end of 2020 has continued to inspire us to be better and do better, and we knew this was the clear next step.”

The full VitaFusion gummies line will convert to recycle-friendly shrink-labeled packaging within 2019, the company says.

Trace Minerals recently rebranded, too, and its marketing manager Scott Boyson says the company was seeking a “fresh new look” for the line, after ten years of the same packaging
design. “Packaging was an important part of the rebrand,” Boyson says. “We did stay with our cobalt-blue bottles because we felt strongly that our consumers had identified our brand with that bottle, and we didn’t want to create any confusion since we knew we would be changing the logo and design.” The company understood that the blue bottle stood out on the retail shelf, so it left that one element alone. Instead, marketing and branding firm BrandHive—hired by Trace Minerals to lead the rebrand—simplified the front of the label, which had “gotten too busy with logos and other violators,” Boyson explains. BrandHive chose “clean,” updated fonts and bold colors, and a metallic “swoosh” to convey a premium look. Labels and boxes were switched from glossy to matte, and a soft-touch finish was applied to boxes as well. “We wanted consumers to see and feel that ours is different from other products, that it is higher quality than others on the shelf,” Boyson says.

Other Considerations
Retail Voodoo’s Lemley says that beyond the visual uniqueness and attractiveness of the packaging artwork, other packaging considerations include holistic sustainability, which he says includes everything from sourcing the packaging materials to discarding the empty container. (See the sidebar on page 73 on Vitafusion’s new fully recyclable gummies packaging.) He also points to an observed increase in the consumer’s desire for portability. “This could be a great opportunity for supplement, wellness, and functional-food brands willing to think about dosing as portion control and provide a sustainable answer to single use, travel size, etc.”

Trace Minerals’ Boyson calls his company’s rebrand one that pairs a “premium look” with environmental friendliness. “Almost all of our packaging is recyclable,” he says. “It is important to us to reduce our carbon footprint as much as possible.”

Alpha Packaging’s (St. Louis) vice president of marketing, Marny Bielefeldt, says her company is seeing increased requests for 100% post-consumer resins across a number of categories. “Sustainable packaging can reinforce a brand’s commitment to the environment and to clean ingredients,” she says. “We find that the companies that value recycled plastic most are those companies making commitments to sustainable practices across many areas of their business. Alpha makes bottles in food-safe PET or HDPE post-consumer resin for all the industries we serve.”

Compliance with labeling regulations is a consideration cited by Gaia’s Terral. “We follow the guidelines set by FDA with diligence and compliance,” he states. “We go above and beyond to grow and source the cleanest ingredients possible. We screen our ingredients at our Gaia Lab in Brevard, North Carolina, and we share the results online in our meetyourherbs.com traceability platform.”

“The challenge in creating packaging for nutritional supplements,” he continues, “is to work within the strict confines of a highly regulated industry. Others may make claims on their packaging that we deliberately choose not to make. We do so for the sole purpose of not only ensuring FDA compliance but also to affirm with our customers our commitment to operating a business with integrity, confidence, and conviction.”

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.
Any Questions?

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Beauty and the Bar

Beauty bars—and other foods and beverages—are making nutricosmetics a convenient and easy proposition for today’s customers.

BY SEBASTIAN KRAWIEC, ASSOCIATE EDITOR

Functional foods and beverages are a popular delivery format for nutricosmetic ingredients these days. According to Innova Market Insights, the number of foods and beverages positioned toward skin health has seen 15% average annual growth globally between 2014 and 2018. During this same period of time, new food and beverage product launches tracked for skin health increased by 12%.

Collagen, to use a popular nutricosmetic example, is a highly versatile ingredient that is easy to incorporate in foods and beverages. It’s also very recognizable, having been a staple of the dietary supplement industry. “Collagen is a desirable ingredient,” says Jayla Harnwell, co-founder of Kalumi, a functional bar company. “People are starting to realize collagen is playing a big role in the look of hair, skin, nails, and even other benefits like feeling full longer.”

Kalumi manufactures “Beauty Bars” that showcase collagen for skin health, as well as a high fiber content from yacon syrup to promote satiety and support weight management. Reflecting the marketing style of the cosmetic and nutricosmetic industry, Kalumi is a lifestyle brand that carries an aspirational message. The products feature branding that invokes sophistication and femininity, targeting a very specific consumer. In fact, the company’s founders, young female professionals, really reflect the target consumer.

“We were both dealing with a number of health issues caused by the lack of healthy food available to us while constantly traveling and working. Jayla’s mom, who is a naturopath, recommended we both take collagen as a supplement to help replenish protein levels and ultimately improve the quality of our hair, skin, and nails,” says Chrissy Blair, co-founder of Kalumi. “After seeing and feeling the difference that collagen made to our overall health and appearance, we were hooked. We would carry white powder with us in Ziploc bags and try to find beverages we could mix it with, but it was so inconvenient. This was what inspired Kalumi.”

The desire for convenient nutrition is a big driver for functional food and beverage products. These products are easily incorporated in one’s busy routine and take the guesswork out of nutrition. “We wanted to create a well-rounded, nutrient-rich, and satiating snack/meal replacement for busy people to keep them looking and feeling their best,” says Blair. “Not only do our bars contain 12 g of marine collagen, they also contain 15 g of protein and less than 6 g sugar from organic yacon syrup, which is a low-GI prebiotic fiber.”

Beauty brands like Kalumi also focus on creating a community around their products through direct-to-consumer sales and social media. Kalumi sells direct to consumers, as well as to retailers, but offers a subscription service that allows customers to buy more products at a discount. “We decided to focus on direct-to-consumer through our website so we can keep a close relationship with our customers, which is important to us, especially at this early stage. About 30% of our customers are subscribers,” said Blair. “In terms of retail, we have partnered with select, like-minded retail accounts to help build brand awareness and to be available where new potential customers are shopping. The reason we went with this particular business model is to have more control over maintaining a close relationship with our customers so we can educate them on the many benefits of our product and really enhance brand experience.”

That means that at least 30% of Kalumi’s customers are consistently buying its products, and believe in the products. With social media platforms like Instagram, this customer relationship becomes even more interactive and personal. “Social media is a great tool to educate and engage with our community,” says Blair. “It gives us the opportunity to highlight our brand values and get feedback on our products so we can always continue to improve and adapt. It’s also a great way to introduce people to our products and direct people to the site to learn more.”

While collagen is the talk of the town, other functional food ingredients that target beauty are sure to break into the category. For example, according to Innova Market Insights, food and beverages targeting skin health that contain turmeric have seen a 57% average annual growth between 2014 and 2018. B-vitamins are another functional beauty ingredient of interest. According to Innova, between 2014 and 2018, skin health—targeting food and beverages containing vitamin B3 and niacin, and vitamin B7 and biotin, experienced 9% and 25% average annual growth, respectively. Opportunities will only grow for nutricosmetic ingredients as marketers continue to harness the convenience and appeal of beauty foods.
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A SUPPLEMENT TO

Nutritional OUTLOOK

April 2019
Vol. 22, No. 3

WHO IS THE WEEKEND WARRIOR?

And how do sports nutrition brands cater to this growing market?
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What makes an athlete tick?
The sports nutrition industry is amidst a long-term growth trend unparalleled in recent consumer health history. From 2004 to 2018, the global sports nutrition market grew 190% at a compound annual growth rate (CAGR) of 7.9%, according to Euromonitor International. Such high growth for that long is unprecedented in fast-moving consumer goods. Fads and new product developments can stir consumer interest for a handful of years, but even the broadest trends mature and show flattening growth over the long term.

Underlying this growth is an increasingly split market. Core users focus on whey-based proteins and amino acids for muscle building and gaining weight while newer users gravitate toward a variety of other needs requiring different functionality and ingredients. Over the last decade, casual users and healthy-living enthusiasts, interested in broader active-nutrition goals, have emerged as a critical class of consumers that continues to drive trends in this space.

Newer consumers to the category have broader demands for sports nutrition: weight loss, fighting age-related ailments like sarcopenia, or, for vegans and vegetarians, supplementing their diet. There’s also the broad swath of consumers with nebulous health, nutrition, or lifestyle goals who want to live healthy and active lifestyles but aren’t interested in performance goals per se.

The mix of sports nutrition products is expanding to meet the demands of these new consumer groups. Healthy nutrition advocates are drawn less to the traditional offer of whey-based protein and instead opting for fitness-oriented products like plant-protein powders, nodding toward a slimming or clean-label orientation or on-the-go snack-based options like sports protein bars and ready-to-drink (RTD) sports protein.

The expansion to new consumer groups, positionings, and an overall wider health...
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focus has put sports nutrition in direct competition with the broader nutritional products universe, which includes healthy consumables across packaged goods like health and wellness foods, vitamins and dietary supplements, and weight management and wellbeing products that are used to meet consumers’ nutritional and health goals. Newer adopters of sports nutrition are viewing these products as an extension of the larger nutritional purchases they make to meet their daily lifestyle goals. At the same time, product launches and ingredient innovations in healthy snacking have pushed the much larger nutritional space in the direction of sports nutrition as well.

Increased interest in protein as a functional ingredient has created direct competition from the health and nutrition marketplace increasingly saturated by protein products. Most legacy food and drink companies have introduced a protein-fortified extension to tie their brand to the protein halo, especially within the snacking universe. As newer sports nutrition evangelists demonstrate, meeting consumers’ insatiable appetite for protein can come in several forms. Though these products have performance and exercise benefits, many times they are marketed as better-for-you snacks. Protein launches are popping up all over the grocery aisle, and given the broad positioning of protein, it is increasingly unclear how these products should be consumed. Are they purely for functional/healthier snacking? Can consumers swap these products in before, during, or after a workout? This intentional blurring means that some consumers will use these products for both purposes.

As mainstream consumers are more amenable to purchasing sports nutrition products, companies in the space are extending their distribution to mass channels that historically have shown limited interest in sports nutrition. Given the on-the-go functionality of sports protein bars and sports protein RTDs, these products have easily made the jump to smaller mass-oriented channels like convenience stores and forecourt retailers in the U.S., with a similar push occurring in other principal markets like the U.K. and Australia. At the same time, these retail channels are undergoing a transformation from stocking only quick, on-the-go snacks to a broad mix of healthy living and lifestyle brands. Sports nutrition companies are already benefitting from this reconceptualization and have landed distribution deals...
in these channels, reinforcing these products’ emergence as a viable substitute to traditional snacking.

Leading sports nutrition companies are extending their portfolios to new users without having to reorient the muscle-focused pitch. Acquisitions are a major factor on this front. For instance, Glanbia has led this effort through its acquisitions of the energy bar ThinkThin in 2015 and both the protein supplement Amazing Grass and the active nutrition protein portfolio of Body & Fit in 2017. Other examples of this trend include Nature’s Bounty acquiring the energy bar The Best Bar Ever in June 2018 and PepsiCo acquiring the plant-based protein nutrition company Health Warrior in November 2018, setting the stage for its recent acquisition of legacy sports nutrition company CytoSport.

Sports nutrition is expected to outpace the broader set of nutritionals through 2023 at an 8% global CAGR, compared to less than 3% CAGR for other adjacent nutritional categories, according to Euromonitor International. Sports nutrition sits in a valuable position, as the category builds from performance and exercise goals into wellness and lifestyle positioning as necessary. Euromonitor International expects sports nutrition to cross the US$20 billion threshold in 2021 globally and reach US$23 billion in 2023.

However, strong growth is predicated on continued innovations keeping sports nutrition at arm’s length from the broader mainstream nutritionals space. Though the number of core users continues to expand, especially in emerging markets, the category needs other consumer groups outside core users to sustain the growth the industry has come to rely on this decade. As a result, much of the innovations expected to guide category growth in the future will come from extending offerings to broader consumer groups rather than retrenching around core functionalities.

Matthew Oster is the Head of Consumer Health at Euromonitor International, overseeing the industry’s research and analysis and leading a team of experts in 100 markets worldwide. As Head of Consumer Health, Matthew provides insight into the consumer trends, key markets, competitive landscape and growth opportunities in the global consumer health space to help organizations make strategic business decisions. Prior to this role, Matthew was the Head of Institutional Channels, where he analyzed the changing global healthcare landscape and its effects on the B2B marketplace for goods and services. Matthew has worked in market research since 2011 and holds a master’s degree from the Johns Hopkins School of Advanced International Studies.
Along with "What do you do?" and "Where are you from?" the list of all-purpose icebreakers has expanded to include this query: "What are you training for?" For whether it’s a Tough Mudder, a tri, or Monday-morning spin class, odds are that you or someone you know is sweating over something.

So with all these newly minted exercisers chasing PRs and tracking every erg of output, the number of consumers thinking deliberately about how to fuel their engines has grown—and makers of sports-nutrition products find themselves facing a whole new set of mouths to feed.

But though today’s “weekend warriors” may fancy themselves champions, can a sports bar or protein shake really make a difference in how fast they cross the finish line?

It’s a provocative question, and as Bruce Brown, MPH, MA, president, Natreon (New Brunswick, NJ), observes, “Whether weekend warriors push themselves toward personal bests or simply enjoy engaging in exercise in a community environment, optimal performance requires that bodies be ready when needed. And product is emerging to address the spectrum of needs for those who describe themselves as weekend warriors.”

National Pastime
The sports-nutrition market was going strong even before casual competitors started swelling its ranks, but their participation has surely added to the gains.

Consider that Grand View Research expects the global sports nutrition market to hit $24.43 billion by 2025, reflecting a CAGR of 9.7%. And though this growth “is driven
by increasing consumer awareness, rising interest in healthier food, and the increasing availability of information and access to studios and gyms across the country through fitness apps, we foresee the group of casual, recreational athletes continuing to increase, making the sports nutrition market even bigger year over year,” says Georgia Dina Konstantopoulos, communication manager, FrieslandCampina Ingredients Active Nutrition (Paramus, NJ).

The emergence of casual competitors also explains why “the demographics and landscape of the sports-nutrition category have seen so much change in the past few years,” adds Andrew Wheeler, vice president of marketing, FutureCeuticals Inc. (Momeonce, IL). “These products were previously mostly for bodybuilders and hardcore athletes, and were geared mainly toward men. But the focus has gradually shifted, and sports nutrition is now for everyone, from endurance athletes to weightlifters to weekend warriors.”

Demanding Demographic

Just who that weekend warrior is confounds easy description, but observers agree that, en masse, the demographic is driven, demanding, and spans genders and ages, from the Millennial to the more mature.

Adds Konstantopoulos, “Weekend warriors are the busy bees of the workweek who, because of job or family obligations, commit to working out mostly during the weekend.”

Help from fitness-tracking devices and social media make that commitment harder to escape, “so it’s common for them to engage in the most trending and up-and-coming types of exercises,” Konstantopoulos continues: Pure Barre, yoga, Pilates, interval training, gym classes, and outdoor pursuits like swimming, biking, running, triathlons, and mountain biking.

Whatever sport they choose, “These consumers are willing to invest heavily in active lifestyles that match their crowd and culture,” says Elyse Lovett, marketing manager, Kyowa Hakko USA (New York City). Equally important, “They’re willing to spend a little more on products that meet their high demands for convenience, functionality, and clean labels.”

Ermel Manuel, technical sales support manager of adult nutrition at Friesland-Campina, agrees. “Weekend warriors are all about convenience,” he says. “They opt for tasty, clean-label, on-the-go products such as beverages, bite-sized bars, cookies, and other snacks that support their fitness goals.” Less appealing, he contends, are products that require hands-on preparation, like powdered beverages.

Don’t Go Overboard

Such lifestyle preferences are not lost on sports-nutrition brands, which “are getting savvier” about playing to their emerging audience, says Mallory Junggren, senior director of marketing, Nutrition 21 LLC (Purchase, NY). “They’re observing this change in consumers and are investing in and producing products that are more natural, healthier, backed by science and—overall—more relatable to this evolving consumer.”

Relatability aside, formulators also recognize that weekend warriors’ nutritional needs diverge substantively from those of more traditional elite athletes, and this is why we see a big difference in product offerings that cater to each group,” says Konstantopoulos.

For example, where an ultramarathoner or distance swimmer might struggle to consume enough calories, casual athletes aren’t so lucky. “Caloric control is an important driver for this group,” says Manuel, “with consumers wanting the right number of calories from the right sources.” Serving sizes should thus supply sufficient fuel without tipping into excess.

Fueling that Fits

Beyond that, the differences grow starker. “Elite sports-nutrition products tend to focus on four areas: performance, endurance, muscle building, and recovery,” says Cliff Barone, global ingredient marketing, Lonza Consumer Health & Nutrition (Morristown, NJ). “But for weekend warriors, recovery is often key, as is support for joint comfort and mobility.”

In fact, weekend warriors—especially Millennials—have been “the driving force” for joint-health innovation, Barone says. “As Millennials have become more active and receptive to new sports trends, such as high-intensity interval training—or HIIT—they desire practical, on-the-go products that help prevent injuries and cartilage degradation while supporting muscle recovery and meeting dietary preferences.”

He claims that his company’s UC-II undenatured type II collagen has a leg up on ingredients like glucosamine and chondroitin because its “unique mode of action suggests that it triggers cell-signaling cascades, using the body’s own natural repair mechanism to help rebuild the cartilage that’s been eroded in the joints.” A randomized, double-blind, placebo-controlled study1 from 2013 found that 40 mg of the product taken daily supported joint comfort in healthy subjects regardless of age group.

On the recovery front, Larry Kolb, president, TSI USA Inc. (Missoula, MT), emphasizes that for weekend warriors, “The need is faster recovery, less pain on Monday morning, and the ability to feel great and be ready to do it again the next weekend.”

But almost by definition, weekend warriors need more recovery support. “Untrained people, or people who train or work out only one to two times per week, have greater exercise-induced muscle damage,” Kolb explains. “Because of their lower training level, exercise induces muscle-protein breakdown in weekend warriors to a level that we only see in elite competitors during overtraining.”

Hence the need for ingredients like myHMB—a branded form of beta-hydroxy beta-methylbutyrate, a leucine metabolite that the body produces in protein synthesis—which Kolb says “is known to reduce exercise-induced muscle damage and speed recovery.”

Lonza’s Carnipure L-carnitine tartrate can also ease recovery by ameliorating post-exertion oxidative stress, muscle tissue damage, and muscle soreness2. Barone says. Research3 indicates that it can increase blood flow, while also reducing levels of metabolic-stress markers.

Junggren brings it back to the fact that sports-nutrition ingredients must meet individual athletes’ needs. “Elite athletes and bodybuilders are training for significantly longer periods in intense settings while working various muscle groups and body parts throughout every training session,”

Branded Ingredients by Sabinsa, accept no imitations. Sabinsa offers a range of sports nutrition ingredients, which caters to the needs of sports enthusiasts and professional athletes alike. Manage healthy body weight and increase lean body mass using clinically proven weight management ingredients like ForsLean®, GarCitrin® and LeanGard®.* Reach your peak performance using the isotonic freeze dried nourishment from coconut water, Cococin™.* Curcumin C3 Complex®, NiLitis® and our full spectrum Boswellin® PS manages healthy joints, which can take care of both your pre and post work out needs.* Improve your nutrition status with digestive aids such as DigeZyme® and LactoSpore®.*
“We find there’s growing interest not only in optimizing pre-workout, but in preparing the body days ahead through proper sleep and focus, all of which lead to enhanced output in sport or exercise,” says Natreon’s Bruce Brown.

Protein a Pleaser
Speaking of BCAAs and EAAs—branched-chain amino acids and essential amino acids, respectively—one can’t emphasize enough how important protein is to casual athletes, and how important those athletes have been to protein’s success.

“Protein-enhanced products are the major beneficiary of the sports-for-everyone trend, with high-protein launches seeing annual growth rates near 30%,” says Pam Stauffer, global marketing programs manager, Carn gill (Minneapolis). Citing 2018 figures from the Euromonitor database, she says that the domestic protein category looks set to ride a CAGR of 12% through 2022 to hit a total of $11.7 billion.

Dairy and soy proteins are as relevant as ever, she says, with plant sources—especially pea—increasing in appeal. She says its label friendliness, mild flavor, and functionality in formulations ranging from beverages and bars to powders, snacks, baked goods, and dairy alternatives make it a winner.

Adds Junggren, “For those looking to consume protein post-workout to support muscle growth and recovery, there are other products that can enhance traditional protein powders’ effects.” Combined with 6 g of whey protein and sweat equity—that is, exercise—her company’s Velositol complex of amylopectin starch and chromium “doubles the amount of muscle protein synthesis compared to whey alone,” she claims.

But as with all else in life and fitness, there can be too much of a good thing—even protein. Thus, says Kolb, “We have to help weekend warriors translate their consumer needs into products that can meet those needs without overshooting nutritional goals. Most protein products come with extra calories, as they’re intended to increase muscle mass, strength, and power, and that’s usually not the weekend warrior’s goal.”

Think about it
“Protein is always hot across all users,” Lovett concedes. “But in the past five years or so, we’ve seen more awareness and use of ingredients that connect cognitive health to sports nutrition.” Ingredients that promise focus, attention, concentration, and mental energy—and that “really give that mental edge that consumers are looking for”—are getting serious buy-in.

Case in point: “Citicoline is made naturally in the body and is a potent brain-health nutrient,” Lovett notes. Her company’s branded form of the compound—Cognizin—has shown in studies to benefit focus, attention, and mental energy.

Brown and company have noticed attention turning to adaptogens like ashwagand ha and shilajit “to help the body and mind adjust to the stressors of modern life and exercise,” he says. “We find there’s growing interest not only in optimizing pre-workout, but in preparing the body days ahead through proper sleep and focus, all of which lead to enhanced output in sport or exercise.”

Proof in the Pudding
But whatever ingredients sports-nutrition formulators choose, they better have proof of efficacy at the ready. Because though weekend warriors may not be the fastest sprinters out of the gate, they’re pretty quick at investigating a product’s bona fides.

“These consumers are looking for strong science and structure/function claims in their sports nutrition products,” Wheeler says. “The ’take it, feel it’ products that boost performance, build muscle, hydrate, refuel, recover, and burn fat are widely popular, as is the ability to research the science and claims behind them. Transparency and substantiation are not optional. They’re expected—and if you don’t deliver them upfront, consumers notice.”

So sports-nutrition brands, take heed. “The weekend warrior is, and will continue to be, one of the driving forces in the growth of sports nutrition products,” Kolb says. So don’t promise what you can’t deliver. “Just as Air Jordans don’t make you jump like Mike, sports nutrition products won’t turn a weekend warrior into an elite athlete.”

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.

References
Jiaherb recognizes that there is much uncertainty among manufacturers and consumers about the integral quality of the botanical products they purchase. As a testament to our never-ending commitment to customer satisfaction, and to ease customer concerns about the integrity of our products, Jiaherb proudly introduces HerbaLink™.

HerbaLink, a unique chain-of-custody program, offers ultimate transparency in product identification and traceability. The program not only assures best practices in identifying sustainable and socially conscious sources, but also the implementation of stringent testing methods that include DNA, HPTLC, HPLC and GC throughout the processing and preparation of the finished product — documenting every link of the product’s journey from harvest to packaging.
In February, then-FDA Commissioner Scott Gottlieb announced the agency’s planned efforts to modernize regulation of dietary supplements. Gottlieb’s statement kicked off with an acknowledgment affirming what most of the dietary supplement industry already knows: “The use of dietary supplements, such as vitamins, minerals or herbs, has become a routine part of the American lifestyle.” Supplement usage is widespread, especially in many sports—from running and cycling to baseball and bodybuilding. And it’s not limited to elite athletes and professionals. Students, recreational athletes, and “weekend warriors” are a significant segment of the fast-growing sports nutrition market. But dietary and sports supplements sometimes contain banned substances and mislabeled ingredients—just ask the many elite athletes who’ve been suspended from their sports due to inadvertent doping. While suspension from competition is a serious concern for elite athletes, it’s the greater public health risk for athletes and consumers which should remain the industry’s central focus.

In the last 10 years, I’ve worked closely with researchers from Harvard Medical School, the National Center for Natural Products Research (NCNPR) at the University of Mississippi, and the National Institute for Public Health and the Environment (RIVM) in the Netherlands. In our published research, we’ve found that some supplements in the global market contain potentially harmful ingredients and contaminants, including...
researchers published our peer-reviewed sport, our international team of public health on the WADA list of substances prohibited in than two years after higenamine was included Anti-Doping Agency (WADA) in 2017. Less the list of banned substances by the World United States. Th e potential public health available for purchase via the internet in the weight-loss and sports/energy supplements potentially harmful levels of the substance in supplements remains uncertain. A small number of clinical trials were performed in China, but none used an oral dosage form of higenamine. Consumers are urged to use caution when consuming supplements labeled as containing higenamine.

What Is a Beta-2 Agonist?
Beta-2 agonists act as smooth muscle relaxers and may be used to treat asthma and other pulmonary disorders. Beta-2 agonists are so-called because they activate the beta-2 adrenergic receptors, inducing relaxation of the trachea-bronchial muscle and bronchodilation to open the airways. An example of a common drug in this class is albuterol, which can be found in fast-acting inhalers. Potential risks of beta-2 agonists include tachycardia, or an accelerated heart rate, as well as tremors, excessive sweating, anxiety, insomnia, and agitation. While higenamine is a beta-2 agonist, there has not been sufficient clinical research to understand if it poses the same benefits and/or risks as the beta-2 agonists currently used in the treatment of asthma.

Unlabeled, Inaccurate, and Potentially Harmful
In 2018, we published findings on a substance called higenamine (sometimes labeled as its synonyms “norcoclaurine” or “demethylcoclaurine”) in unpredictable and potentially harmful quantities in some supplement products, ranging from trace levels to 62 mg per serving. Of the 24 products we tested, only five listed a specific quantity of higenamine on the label, and none of those five quantities were accurate. The findings were published in the peer-reviewed journal Clinical Toxicology.

Higenamine is a beta-2 agonist added to the list of banned substances by the World Anti-Doping Agency (WADA) in 2017. Less than two years after higenamine was included on the WADA list of substances prohibited in sport, our international team of public health researchers published our peer-reviewed study documenting inaccurately labeled and potentially harmful levels of the substance in weight-loss and sports/energy supplements available for purchase via the internet in the United States. The potential public health threat from higenamine dosages found in

John Travis has more than 20 years of experience as an analytical chemist specializing in the analysis of dietary supplements. As senior research scientist, dietary supplements, at global public health organization NSF International (Ann Arbor, MI), Travis analyzes hundreds of dietary supplement products each year for various contaminants, emerging drugs, and harmful compounds. He is a subject matter expert on athletic banned substances and was instrumental in the development of the screening methods used for the NSF International Certified for Sport® program, which now screens products for more than 270 banned substances on the World Anti-Doping Agency, National Football League, Major League Baseball, and National Collegiate Athletic Association lists. Travis is currently involved in the analysis of pharmaceutical agents and illicit drugs, stimulants, and other prohibited substances as both adulterants and contaminants in dietary supplements and functional foods, co-authoring scientific papers on ingredients of concern found in dietary supplements, including stimulant drugs DMAA, DEPEA, and DMBA.

Independent Testing and Certification
The impact of mislabeled and inaccurate ingredient listing is well-known in the dietary supplement industry, but the public health risk it imposes justifies a consistent reminder to manufacturers to maintain the highest possible standards of quality and accountability. The actions of a few bad manufacturers can generate a potential public health risk and reflect negatively on the entire supplement industry. Fortunately, reputable companies can seize this opportunity to showcase their products’ safety, verify label claims, and differentiate themselves in the marketplace. Independent third-party certification of dietary and sports supplements and ingredients helps protect the public health by providing an avenue for consumers to choose independently verified products and brands to demonstrate their commitment to quality.

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The sports drinks market is fertile ground for innovation, with a number of brands working on new formulations using non-traditional ingredients. As consumers continue to become more health conscious, brands are responding by creating sports drinks with natural, plant-based ingredients. Here are just a few of the trends in sports drinks, driven by consumers’ growing awareness of health and nutrition.

**Formulators Switch to Plant Proteins en Masse**

Following the general market trends, the sports nutrition space is increasingly adopting plant-based ingredients. Jim Tonkin, founder and president of Healthy Brand Builders (Scottsdale, AZ), says that one of the most exciting innovations in sports nutrition is industry’s transition to plant-derived proteins in drink formulations.

“Whey protein isolate is what most people in the industry have been using,” Tonkin says, “but the industry is now switching to plant-based proteins like pea, rice, chia, and hemp.”

Tonkin says the sports drink market is also seeing a surge of activity in sports waters, including the addition of new protein-enriched water products. Furthermore, brands entering the sports water space are increasingly marketing their products using terms like “hydration” and “hydrating benefit,” which Tonkin says is a misnomer.

“The energy coming to the hydration space is overblown,” he says. “Our bodies are 80% water. We have to drink regularly to rehydrate ourselves. Any water-based beverage is hydrating.”

Tonkin notes that while much of the industry’s attention is on plant-based proteins, whey protein isn’t going away anytime soon. Plant-based protein beverages are gaining in popularity, yes, but whey protein is still commonly used in sports drink formulations.

**Clean Energy Squares Off with Traditional Energy**

The “clean energy” category is quickly becoming a strong contender in the energy drink space. Market researchers expect natural and organic energy drinks to outpace traditional energy drinks in growth over the next five years. Holly McHugh, marketing associate for Imbibe (Niles, IL), says that Grand View Market Research is forecasting natural and organic energy drinks will occupy 40% of the energy drink market by 2025, reaching $32 billion in annual sales.

“There is enormous potential for the natural and organic energy drink category,” McHugh says. “Brands are incorporating naturally energizing ingredients like green coffee, green tea, and ginseng, and are positioning their products as clean-label by making claims like ‘natural energy.’”

Tonkin agrees, noting that clean-energy drinks have been building slowly due to the fact that the existing major energy drinks players are reluctant to give up market share. Now, though, energy drinks made from natural sources like yerba mate are making their way into the market and are forcing established companies to rethink their plans.

Says Tonkin: “Monster, Red Bull, and Rockstar own the energy space, and they...”
aren’t going to give it up easily. While these big players hold on to their declining percentages year after year, they’re also buying newly developed products that consumers love in order to expand their portfolios. These big companies aren’t very good at innovating. It’s easier for them to spend $300 million buying a smaller company than it is to create a new product themselves.”

Protein, Cognitive Performance Dominate Pre-Workout Drinks

Pre-workout drinks are quickly adding more functional ingredients that can help athletes perform better and recover faster. McHugh notes that ingredients like collagen and nootropics are featuring more prominently in these beverages thanks to their brain-boosting and body-repairing properties.

“Nootropic ingredients are suggested to improve focus on exercises, especially when it comes to counting reps or competitive sports,” McHugh says. “Collagen is also being used in some sports nutrition products to aid in joint recovery.”

McHugh says that protein is still a major player in pre-workout drinks, and protein waters in particular are well positioned for market growth.

CBD: A Complicated Future

Industry interest in CBD-enriched sports drinks is growing, but CBD’s future as a supplement is far from certain. McHugh says that CBD will likely become a major ingredient in sports formulations this year thanks to its anti-inflammatory and pain-relieving properties.

Tonkin, though, cautions that CBD is far from ready for the market. Despite the passage of the Farm Bill, he says, CBD has not been approved in the United States as a dietary supplement or food product.

“The Farm Bill allows for hemp to be grown in the United States, but it’s going to be done in a controlled environment. CBD is going to grow in a few different ways, and it is going to become popular, but right now it’s a complicated time. I think you’ll start finding it in small shots that are conditioned for muscle relief.”

Brands Continue the Search for the Magic Bullet

Sports drinks are expected to continue growing, with an emphasis on a simple, clean-label ingredient approach. As the sports drinks industry diversifies, brands will continue working on innovative products while also moving toward organic, low-sugar formulations.

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.
Sports supplements have traditionally involved high-protein formulations, but now, research indicates that probiotics may have a place in the world of sports nutrition. Beyond just maintaining gut health, probiotics may play an important role in accelerating fat loss, shortening recovery times, reducing subjective feelings of soreness, and combatting inflammation, studies show. Here are just some of the potential sports nutrition applications of probiotics—and the studies that validate them.

**Anti-Inflammatory Probiotics Promote Muscle Recovery**

Ralf Jäger, PhD, is the cofounder of Increnovo LLC (Milwaukee, WI), a scientific advisor to Ashland Inc. (Kearny, NJ) and the lead author of the upcoming International Society of Sports Nutrition (ISSN) position stand on probiotics that is slated for publication later in 2019. Jäger says probiotic ingredients can serve a valuable role in sports formulations thanks to their ability to promote muscle recovery and reduce inflammation.

“Muscle damage is caused either through oxidative stress or through inflammation,” Jäger says. “*Bifidobacterium breve* BR03 is the leading probiotic strain for combatting inflammation. We [Increnovo] conducted a double-blind, placebo-controlled crossover trial to study the effect of probiotic supplementation on athletic performance, muscle damage, and recovery following muscle-damaging exercise. Three weeks of probiotic supplementation reduced baseline inflammation and improved performance and range of motion.”
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*These statements have not been evaluated by the Food and Drug Administration. This product is not intended to diagnose, treat, cure, or prevent any disease.
The trial1 that Jäger cites followed 15 healthy resistance-trained men between the ages of 21 and 29 who received a daily dose of a probiotic containing 5 billion units each of *Bifidobacterium breve* and *Streptococcus thermophilus*, or a matching placebo, for 21 days while performing muscle-damaging elbow exercises. A 21-day washout period separated the crossover conditions. The study authors measured participants’ performance on an elbow flexor task, as well as their interleukin-6 levels. The study found that probiotic supplementation reduced baseline and post-exercise inflammation, attenuated post-exercise decreases in performance, reduced interleukin-6 levels, and improved recovery.

John Quilter, vice president and general manager of GanedenBC30 for Kerry Functional Ingredients & Actives (Mayfield Heights, OH), says that the probiotic strain *Bacillus coagulans* has properties that make it ideal for post-exercise products that reduce muscle soreness and promote recovery.

"Generalizing about the benefits of probiotics is risky," Quilter says, "because no two strains are the same—and in research, the results are always strain-specific. However, initial research found that [Kerry’s branded *Bacillus coagulans* GBI-30, 6086, ingredient] GanedenBC30 enhances the body’s ability to efficiently utilize protein, making this strain an excellent ingredient for use in sports nutrition products."

Quilter points to the results of an additional study2 on GanedenBC30, funded by the company, that examined the effects of a combination of a probiotic supplement and 20 g of casein protein versus casein alone. This placebo-controlled repeated-measures trial followed 29 recreationally trained men in their early 20s and measured their athletic performance and level of muscle damage following exercise. Participants engaged in muscle-damaging single-leg exercises and were evaluated for perceived recovery, muscle soreness, creatine kinase levels, muscle thickness, and blood urea nitrogen levels at one, two, and three days after exercise.

The study found that combination protein-plus-probiotic supplementation increased perceived recovery, reduced muscle soreness, decreased muscle damage, and prevented an exercise-induced reduction in athletic performance relative to just protein supplementation alone. The probiotic-plus-protein group showed a lower post-exercise increase in serum creatine kinase relative to the protein group, indicating less muscle damage. The study authors concluded that the combination of the probiotic and the protein reduced muscle damage and significantly improved recovery.

*Bacillus coagulans* Boosts Amino Acid Absorption

Jäger, who coauthored the study that Quilter references, says that GanedenBC30 holds promise as a sports supplement in more ways than one. *Bacillus coagulans* has also been shown in studies to influence digestive enzymes in a manner that improves amino acid absorption from protein. Another of Jäger’s studies, a literature review3 on the effect of GanedenBC30 on protein utilization, found that GanedenBC30 produces active digestive enzymes like alkaline proteases that, when administered jointly with protein, boost blood amino acid concentrations.

Jäger says that probiotics are currently being studied for their value as sports supplements in 42 human clinical trials, but most of these studies are on the implications of probiotics for immune health in athletes. Very few studies, he says, are examining the potential benefits of incorporating probiotics in a resistance-training regimen. Jäger expects future research to examine probiotics’ other potential benefits:

"Probiotics have been linked to normalizing age-related drops in testosterone levels, reducing stress-induced cortisol levels, improving mood, and reducing age-related muscle loss," Jäger says. "But more research, on athletes specifically, is needed in order to substantiate these potential benefits."

*Bacillus subtilis* Improves Body Composition and Accelerates Recovery

While the functional properties of probiotics are highly strain-specific, research is showing that there’s more than one species of the *Bacillus* genus that holds promise for sports nutrition. John Deaton, PhD, vice president of science and technology for Deerland Probiotics & Enzymes (Kennesaw, GA), says that clinical trials are now demonstrating the efficacy of *Bacillus subtilis* in exercise formulations.

A randomized, placebo-controlled clinical trial4 funded by Deerland Probiotics & Enzymes followed 23 Division I female collegiate athletes during offseason training and assessed the efficacy of *Bacillus subtilis* as a sports supplement. Over the course of 10 weeks, participants performed three to four upper- and lower-body workout sessions per week and were randomized to receive either 5 billion CFUs per day of Deerland’s *Bacillus subtilis* DE111 strain (n=11) or a matching placebo (n=12). All participants also received a protein and carbohydrate-enriched recovery drink after exercise. Participants were assessed on tests of strength, agility, body fat composition, and muscle thickness at baseline and again at the end of the 10-week offseason training period.

After 10 weeks, the recovery drink-plus-probiotic group saw a statistically significant increase in body fat loss relative to the recovery drink-plus-placebo group. Subjects in the experimental condition saw a 2% decrease in body fat, compared to a 0.2% decrease in the control group. The study authors concluded that probiotic supplementation may be an effective means of improving body composition in collegiate athletes, but caution that the exact mechanism of action remains unclear and requires further study. The study authors also hypothesize that probiotics’ immunomodulatory properties could promote the repair of musculoskeletal tissue after exercise.

Deaton says that in addition to body composition and recovery, probiotics are also desirable as sports supplements for athletes who experience digestive distress. High-protein diets and other sports nutrition trends can create digestive issues that probiotics are ideally suited to address.

"A large number of long-distance runners tend to experience digestive problems due to reduced blood flow to the intestines," Deaton notes. "Athletes also have very high nutrient needs, which are better fulfilled when digestion is improved."

Sports Probiotics Go Smart

Industry experts say they expect the sports probiotics niche to diversify, explore new delivery formats, and adopt a clean-label

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approach. Quilter says that sports probiotics brands will be working on building buyer confidence through robust research and strong branding.

"Sports nutrition consumers tend to be well-informed and curious about what they consume," Quilter notes, "which means a strategy of using branded ingredients is likely to succeed in this space. Sports nutrition customers want a clear point of reference that helps them understand exactly what a product has been fortified with. It builds confidence in a product and helps keep active consumers loyal to a product that works for them."

Deaton says that pill fatigue will lead to probiotics being included in more diverse formulations. Athletes tend to take more supplements than other supplement consumers, he says, which is why sports probiotics will diversify into functional foods and other formats.

"Athletes want superior nutrition and protection from nutraceutical-infused beverages, like healthy recovery drinks with probiotics," Deaton says. "Don’t forget healthy treats, either: imagine a probiotic-enriched dark chocolate bar."

Jäger expects probiotics to expand into multiple areas of sports health, such as hormone regulation and muscle maintenance, provided that further research substantiates these functional benefits. Until then, probiotics will remain a popular supplement for muscle repair and amino acid absorption.

As research continues to investigate the various roles that probiotics can play in sports nutrition, expect new opportunities for innovation. Success in the sports probiotics space will likely involve innovations in delivery systems, marketing, consumer education, and formulation.

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The Whole ATHLETE

What makes an athlete tick? Nutritional support addressing their key health concerns.

BY SEBASTIAN KRAWIEC, ASSOCIATE EDITOR

Performance is obviously key in sports nutrition. It’s for this reason that supplements designed to promote nitric oxide production are becoming a big seller. Nitric oxide increases vasodilation in the body, improving blood flow, which allows for longer workouts, as well as quicker recovery. Ingredient suppliers continue to innovate nitric oxide–boosting supplements, seeking to improve efficacy and utilize natural, clean-label ingredients.

Focus and mental clarity are crucial in fitness. “Mind over matter,” states the old adage, and sometimes consumers need help mastering the mind just as much as they need help mastering the body. Nootropics and adaptogens are gaining traction in the sports nutrition space as multifunctional ingredients that support both mind and body. Brands are also researching products in young, active subjects, not only changing the way we approach sports nutrition, but also cognition, which has been heavily focused on the aging population.

When it comes to building muscle, protein is king. Though still popular as a powder supplement, protein has become ubiquitous across other categories and retail channels, which means that people are looking for new and different ways to get their protein. According to Nutrition Business Journal, the compound annual growth rate (CAGR) for protein products (beverages, bars, powders, and supplements) between 2013 and 2018 was 8%. Specifically, RTD beverages, nutrition bars, sports powders, and weight-management meal supplements saw CAGRs of 16%, 9%, 7%, and 6%, respectively.1


Exercise can sometimes strain the body in a way that makes one vulnerable to illness. For athletes, getting ill during training can really set them back. That is why immune support is another important crossover category for sports nutrition aimed at fortifying the immune system against disease, as well as reducing the length and severity of symptoms should one get sick. Incorporating vitamins, minerals, herbs, and more is a great way to provide added immune-health benefits in a sports nutrition product.

Joints, bone, muscles, and tendons keep the body together and functioning properly. As good as exercise is for the body, the wear and tear it enacts can also be detrimental if we’re not careful. As such, joint health is an important crossover category for sports nutrition, with ingredients like collagen taking center stage today. Collagen brands are seeing a lot of value in marketing their products toward fitness recovery, giving consumers a way to be more efficient in their fitness regimens.
Athletes perform best when they are prepared, and more than ever before, that preparation begins and ends with pre- and post-workout supplements. As your business grows to meet this demand, you need a packaging partner who can keep pace with you while protecting the quality and reputation of your product.

Our wide range of sports nutrition packaging includes HDPE and PET jars and canisters ranging in size from 8 ounces to 2 gallons. With seven North American manufacturing locations and one in Europe, we can minimize the shipping costs to get these bottles to your fillers, and help you keep shelves stocked. Whether you deliver supplements in powder, tablet, liquid or gummy formats, Alpha Packaging has the stock product solutions to help your brand perform. We can also engineer custom packaging solutions or set your brand apart with custom colors that help it compete on retail shelves.

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