



ENERGY/SPORTS PERFORMANCE



**FUNCTIONAL
INGREDIENTS**

MINI-GUIDE



Beyond Caffeine: How the Energy Industry is Evolving

Like a hopped-up Icarus soaring too close to the sun, sales of caffeinated energy drinks took a jolting dive recently. A spate of deaths with potential links to the drinks attracted the attention of Congress, the Food and Drug Administration (FDA), and the media. But the public still craves a lift. Fortunately, the industry is responding with innovative alternatives to caffeine's singed wings, unveiling ingredient versions of rocket boosters, hot air balloon and magic capes that help launch energy levels.

"Almost in the blink of an eye energy drinks have gone from being a popular pick-me-up to a category with a frightful amount of baggage," according to the *Nutrition Business Journal's* 2014 Sports Nutrition Weight Loss Report. Those suitcases of suspicion haven't frightened everyone away, however.

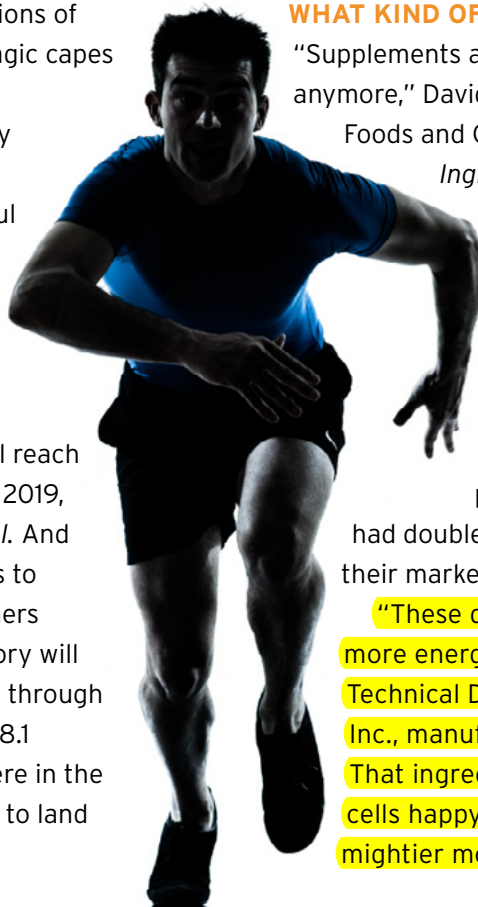
Sales of energy drinks and shots will reach \$11.3 billion in 2014, and \$14.6 billion in 2019, according to *Nutrition Business Journal*. And the sports nutrition category continues to rock harder than the abs some consumers covet. *NBJ* predicts sales in that category will increase by a million dollars every year through 2030, reaching \$5 billion in 2014 and \$8.1 billion by 2019. Icarus is still way up there in the stratosphere and definitely not looking to land anytime soon.

"Americans have become smitten with the pick-me-up process. It started with truck drivers who needed a lift, but has gone way beyond that to Millennials and even seniors, all of whom are chronically upside down in their energy," James Tonkin, a beverage consultant and founder of Healthy Brand Builders in Scottsdale, AZ, told *NBJ*.

WHAT KIND OF ENERGY DO YOU WANT?

"Supplements aren't just for body builders anymore," David Janow, President of Axiom Foods and Growing Naturals, told *Functional Ingredients* last fall. "With the changing perception of health and exercise in the mainstream market, there is a continuous increase in powders, RTDs, bars, chews and more targeting weekend warriors and casual exercise enthusiasts. Our plant protein ingredient production has had double-digit growth year after year as their markets are opening up."

"These days, who doesn't wish they had more energy?" asked Michael Crabtree, Technical Director, Bioenergy Life Science, Inc., manufacturer of Bioenergy Ribose. That ingredient boosts energy by keeping cells happy and healthy, making millions of mightier molecular machines. Manufacturers



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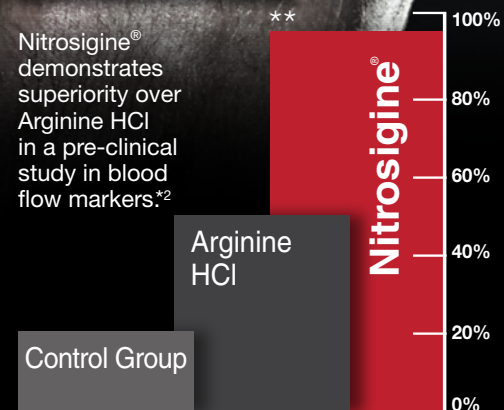
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- Nitrosigine® has been clinically shown to significantly boost nitric oxide (NO) levels,*¹ a key factor in increasing blood flow to working muscles.
- Nitrosigine® has been engineered to take effect in just 30 minutes with results lasting up to 3 hours*¹ – after a single dose.
- Nitrosigine® pre-clinical data demonstrates superiority over Arginine HCl in blood flow markers, with added benefits of significant silicon absorption.*² Blood flow was 4x greater than Control and blood vessel relaxation was almost 5x greater than Arginine HCl.*²
- With continued use, nitric oxide levels build over time,*¹ leading to even better blood flow and vessel flexibility.*²

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1. Kälman D, Feldman S, Samson A, Krieger D. A clinical evaluation to determine the safety, pharmacokinetics and pharmacodynamics of an inositol-stabilized arginine silicate dietary supplement in healthy adult males. *The FASEB Journal* 2014;28(1):SLB418. 2. Proctor SD, et al., A Novel Complex of Arginine Silicate Improves Micro- and Macrovascular Function and Inhibits Glomerular Sclerosis in Insulin-Resistant, JCR:LA-cp rats. *Diabetology*. 2005;48(9):1925-32. DRA211RBTAD081214



of ingredients such as L-carnitine and coenzyme Q10 promote the cellular wellness strategy while others stick with the quick stimulus route, offering caffeine alternatives such as guarana and yerba mate. There's also the slow carb strategy - carbohydrates that get digested gradually, so you don't get jacked with a spike in blood sugar, then slugged with the inevitable crash. Instead, these kinder, gentler carbs create a slow rise and steady state of glucose energy, then a gradual tapering off.

High intensity exercise, which stresses muscles beyond their normal limit in order to get to the triathlon finish line or simply off the couch to find the remote, depletes our energy at the cellular level. Filling up our cellular tanks is slow and metabolically costly - think in terms of not only having to go inside the station to pay for gas, but having to wait while the guy in front of you ponders his choice of cigarettes.

Basically, we didn't evolve from cavemen to be Tough Mudders. "Ten million years ago, when we were chased by saber toothed tigers, we ran back to the cave, rolled a rock over the entrance and then recovered," said Crabtree. "We didn't outrun the tiger for 25 miles. Our evolutionary pathways didn't develop to replace energy that quickly."

INGREDIENT ROCK STARS

Fortunately, science can help. Pre-workout nutritional help is the latest sub-category to sports nutrition, and Nutrition 21's new ingredient, Nitrosigine, fuels pre-workout products. Nitrosigine is a patented complex of bonded arginine silicate with FDA NDI notification status. Nitrosigine is scientifically engineered to provide the benefits of arginine and silicon, with additional benefits from the unique combination. Manufactured in the U.S., Nitrosigine is a safe, non-





stimulant ingredient that's easy to formulate in existing and new sports nutrition products. A new clinical study presented at the Experimental Biology 2014 annual meeting confirmed the product's capacity for optimizing workouts by significantly increasing nitric oxide levels. A novel amino acid compound (arginine silicate), the product's "key active ingredient is arginine, which has been extensively studied because of its ability to enhance nitric oxide, which can enhance blood flow," said James Komorowski, Nutrition 21's Vice President of Scientific and Regulatory Affairs. The study showed that Nitrosigine nearly doubled the maximum blood flow of subjects. The body absorbs it in 30 minutes and the effect lasts up to three hours.

Bioenergy Ribose, a naturally occurring 5-carbon carbohydrate already in our bodies, helps speed that energy replacement and reduce the loss of energy during stress. Ribose is the structural backbone of adenosine triphosphate (ATP), the source for all cellular energy. "ATP is the universal currency between cells for producing energy," said Crabtree. "Almost any reaction in your body requires it." When you take ribose orally, you're essentially contributing the raw material you need to produce ATP. This speeds up the recovery process whether you've depleted your energy stash juggling truck tires at CrossFit or simply blowing out the candles on your 50th birthday cake. As we age, our ATP production capacity naturally slows, a reason the ingredient has so much potential among graying baby boomers, said Crabtree. Studies have also shown that Bioenergy Ribose helps reduce soreness after workouts, allowing athletes to train more often (and conversely, allowing non-athletes to take fewer hot baths and painkillers).

TSI's Peak ATP has also been shown in studies to mitigate soreness, but via a different mechanism. This ingredient, a form of ATP, increases the levels of ATP between cells, in the blood. It serves as a sort of scantily clad muscle cheerleader, boosting the excitability of muscles by raising calcium and glucose levels, stimulating the muscles to contract. The more excitable the muscles, the more powerful and massive they can become. Peak ATP also increases vasodilation, increasing blood flow and the delivery of oxygen and



nutrients to cells in muscles and throughout the body. Demand for the product has already resulted in record annual sales numbers for 2014, according to TSI USA President Larry Kolb.

Chemi Nutra's AlphaSize Alpha-Glycerol Phosphoryl Choline (A-GPC) boosts energy in yet another way. It kicks up the formation of acetylcholine, a chief neurotransmitter in cells, and activates muscle fibers and contractions. The ingredient's been key in brain health formulations and has enormous potential in the sports/energy/performance sector, according to Chase Hagerman, Chemi Nutra Brand Director. Studies have shown it can dramatically boost reaction time and agility - basically acting with a caffeine-like effect on the body's neurons, he said, offering "mind-to-muscle" power to energy supplements, optimizing both the body as well as the mind's performance. Human studies have also recently been published suggesting the company's new Mediator Phosphatidic Acid can help boost strength and muscle mass when combined with resistance exercise. It does this by signaling a specific cellular pathway key to muscle growth.

Four ingredients bring new tools to the sports/energy/performance quiver. Niagen, which is made by Chromadex, improved endurance by more than 30 percent in one study. Found naturally in milk, it's a B3 metabolite -- vitamin B (niacin), but better. It boosts the body's levels of aldehyde dehydrogenase (NAD+, the compound that enables cells to convert fuel to energy) and promotes mitochondrial function. Plus, it does not cause the flushing related to niacin.

In addition to next generation niacin, Chromadex has created next generation caffeine, PurEnergy. A

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patented “supermolecule” combination of 43 percent caffeine and pTeroPure brand pterostilbene 57 percent (a methylated resveratrol), the ingredient allows formulators to cut caffeine content by half without affecting performance. In one human clinical, PurEnergy was superior to caffeine in terms of focus, concentration, alertness and energy after six hours.

Just as Chromadex increased the bioavailability of caffeine with PurEnergy, Proliant Health has developed a highly bio-valuable, easily digested protein source in BeefISO. “It has a unique amino acid profile that is quite compatible for building and repairing muscle tissue,” said Richard Fitter, Proliant Health Marketing Manager. “For years, beef has been the go-to protein source for building muscle, but one of the drawbacks has been a higher fat content. BeefISO gives you the beef protein benefits without the fat or cholesterol drawbacks,” he said, noting that it’s also less likely to cause an allergic reaction than dairy or soy. In addition to the pump-and-crunch crowd, the ingredient is ideal for aging boomers fighting sarcopenia, the age-related loss of muscle tissue caused by decreased protein intake, among other things.

Metabolic Technologies, Inc.’s product, HMB, is also all about helping people harness the power of protein. A metabolite of the essential amino acid leucine in a calcium salt form, it helps increase muscle protein by decreasing protein breakdown and increasing protein synthesis by stimulating growth factors. MTI recently launched BeTOR, a pure, free acid form of HMB that is more rapidly absorbed and better retained by the body.

Studies have shown that when used during training, HMB increases strength, improves endurance, and aids in a faster recovery, something consumers are increasingly interested in, according to Shawn Baier, Metabolic Technologies COO. “People have become more savvy about the importance of recovery and the science behind it, how it allows them to get back to the gym faster and train harder,” he said. “‘Pre-workout’ has been the buzzword for a few years, now I think we’re adding ‘recovery,’” he said. ●



What’s next?

Consumers and manufacturers are paying more attention to nutrient timing—that is, pre-, post-, and during workout nutrient intake-- said TSI’s Kolb. Additionally, great potential exists for products aimed at people who don’t organize their lives around the gym. “We see the biggest opportunity for growth for sports nutrition products outside their classical use - body building and endurance sports,” said Kolb. “Target groups include the aging population to prevent age-related muscle loss or aid recovery, female-specific products, or products for leisure athletes. As sports products address more and more cognitive function, they can be used as brain supplements, too.”

Formulations seem to be shifting to more highly efficacious doses of active ingredients, as opposed to the “proprietary blend” of dozens of ingredients popular in the past, said Chemi Nutra’s Hagerman. “Consumers today are all about transparency; when they see the words ‘proprietary blend’ and a list of half a dozen ingredients, they get suspicious and assume most of those blends wind up just being insignificant amounts of anything.... Consumers are seeking quality products.” Fortunately, it seems manufacturers are developing the quality ingredients needed to create energy concentrations with just a few highly effective active ingredients.



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