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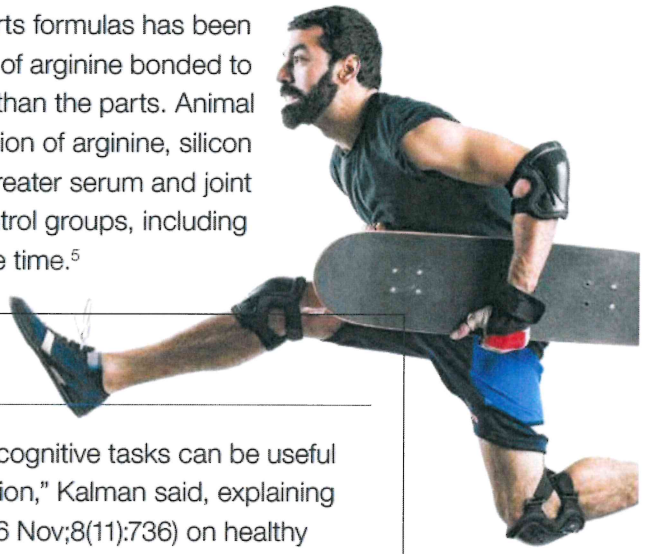
Nitrates: Go With the Flow

Nitrates are a hot ingredient in sports nutrition. Found in many foods, especially vegetables, nitrates are lauded by athletes for increasing blood nitric oxide (NO) levels, thereby promoting vasodilation and improved blood flow. Better circulation means better delivery of nutrients that can support energy and performance. Research on this category of sports ingredients is limited but building, and several studies published in 2016 suggested positive benefits for active consumers.

The primary source of supplemental nitrates for sports formulas has been the amino acid arginine and its precursors. In the case of arginine bonded to silicon, recent evidence shows the sum may be better than the parts. Animal research reported in summer 2016 noted the combination of arginine, silicon and inositol (as Nitrosigine®, from Nutrition 21) led to greater serum and joint tissue levels of both arginine and silicon than in the control groups, including one group taking each individual ingredient at the same time.[5]



Expert Picks: Nitrosigine

"Nutrition to augment and support complex cognitive tasks can be useful for athletes and individuals who engage in competition," Kalman said, explaining the significance of a late-2016 study (*Nutrients.* 2016 Nov;8(11):736) on healthy males taking Nitrosigine. Compared to those taking placebo, the supplement group had significantly improved the ability to perform complex cognitive tests requiring mental flexibility, processing speed and executive functioning.

Around the same time, an in vitro study comparing NO effects from several sports nutrition ingredients found Nitrosigine significantly increased NO production—more than five times—compared to arginine, arginine AKG, citrulline, citrulline malate and agmatine sulfate.[6]

Beetroot is another common source of dietary nitrates in sports nutrition. A randomized, controlled trial (RCT) published in late 2016 found athletes taking beetroot juice for five days had improved sprint times, distance covered and reaction in a series of exercise-based tests, compared to those taking a placebo.[7] Also in 2016, New Zealand researchers reported their study of trained male cyclists found six days of eight days of beetroot juice supplementation produced inconclusive results on VO2peak (oxygen capacity), two common ventilator thresholds and exercise economy, while eight days of beetroot supplementation showed beneficial impact on time trial performance time and power.[8] Still, as an example of how results on nitrates and performance are mixed, another 2016 publication from the same New Zealand researchers concluded beetroot juice supplementation in trained cyclists did not improve overall performance in short-duration time trials.[9]

Takeaways for Your Business

- **Amino acids, nitrates and botanicals (anti-inflammatory/oxidant) led the** way in sports nutrition research in 2016.
- While strength and performance are still the end goals for athletes, more attention to pre- and post-workout nutrition is being paid on the playing field and in the research labs.
- On muscle development, recent research targets have included amino acids such as leucine and specialty compounds like HMB (beta-hydroxy-beta-methylbutyrate) and phosphatidic acid that impact the mTOR, an important cell signaling complex for muscle growth.
- More sports nutrition ingredients are being studied for cognitive or mental benefits for athletes and active consumers. This includes a branded arginine silicate (**Nitrosigine®**, from Nutrition 21) and green coffee extract (as NeuroFactor, from Futureceuticals).
- With the variety of novel ingredients available for sports products, formulators have additional scientific concerns related to bioavailability, digestibility and processing to get the flavor, texture and delivery form just right.
- In beverages containing carbohydrates, it's important to consider high osmolality, which may cause gastric discomfort. Sugars with a low molecular weight such as fructose and glucose tend to yield a solution with a very high osmolality, so high molecular weight (HMW) carbohydrates are starting to attract attention.
- Regulatory status is another concern for formulators of sports nutrition products, as ingredients in this segment often walk a fine legal line. FDA has indicated sports nutrition is a key category of focus, and the agency's latest new dietary ingredient (NDI) guidance is likely to have a significant effect on the sports segment due, in part, to rules requiring ingredients be found in nature and notifications filed for many alterations to existing dietary ingredients.
- The sports nutrition market relies heavily on claims to market supplements and other products. In addition to needing research to back up benefit claims, companies will need to consider the complexity of the claims being made and the likelihood consumers can easily and quickly relate to the claim(s).
- Overall, the regulatory outlook for the sports nutrition industry is difficult to predict—the Donald Trump Administration is pro-business, but promises stricter enforcement of laws. Still, other legal disturbances in the market include class action lawsuits and competitor lawsuits, including Lanham Act cases.
- Intellectual property (IP) protection remains a goal in this segment. A review of nutritional supplement trademark applications and registrations found more than 7,000 included the term "sport," and variations thereof.

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