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Science and search: **How clinical trials match up with social media trends for the most popular ingredients**

Exploring whether the market and scientific potential matches the online hype for collagen, ashwagandha, mushrooms, creatine and electrolytes.

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by **Hank Schultz**

CONTENTS





Click to jump to section!

Science and search: How clinical trials match up with social media trends for the most popular ingredients

by Hank Schultz

This report aims to arm supplement developers with information to help create sticky products that can avoid the boom-and-bust cycle that berberine seems to have undergone. Here's the story of five trending ingredients hitting on both social and science channels.

On the daily, consumers search social media platforms like Instagram, TikTok and YouTube for what they perceive as real-life insight about products that might enhance their well-being. Raw footage and unfiltered commentary from selfie cams worldwide carry more weight than anyone could have imagined — particularly when it comes to making or breaking CPGs (consumer packaged goods) and their active ingredients.

To create products that effectively appeal to these consumers and to achieve differentiation, formulators need to be up to speed on the latest ingredient research, as well as how that research matches what consumers want to know about these products.

In this report, SupplySide Supplement Journal looks at what people are saying about five trending ingredients — collagen, ashwagandha, mushrooms, creatine and electrolytes — and who's sharing the messages. This report also dives into the latest science backing the effects of these popular dietary supplement constituents.

The five categories covered in this report were selected via a search on an AI (artificial intelligence) platform. The target was to find out which ingredients are generating the most buzz among consumers based on an analysis of multiple social media sites.

Real ingredients backed by real science conveyed via responsible messaging can latch onto already motivated consumers who will become repeat buyers.

Lessons learned from berberine episode

In early to mid-2023, interest in berberine skyrocketed when people who post on TikTok began touting the ingredient's weight management potential, dubbing it "Nature's Ozempic." Consumers were looking for alternatives to the popular and oft-effective weight loss drug because of its high cost when paid for out of pocket, the fact that it's taken by injection, as well as some of its potential negative side effects.

The posting and reposting videos touting berberine's effects had a marked effect on the market. According to data collected by market research firm SPINS, sales of berberine products as measured in successive four-week cycles almost doubled between mid-2022 and mid-2023.

According to Google Trends data, attention around the ingredient as measured by search activity showed a strong spike in mid-2023, and then fell off quickly, settling back to a level that is still more than five times greater than the pre-craze search activity.

Berberine has some evidence backing its blood sugar management effects but very little connecting it directly to weight management endpoints. That could have figured into the dramatic up and down experienced by berberine, as followers of the TikTok videos who tried the products may have found the results to be underwhelming. (That could have been in part because some of those products were understrength and/or adulterated with cheaper fillers, but that is a topic outside our current scope.)

This report aims to arm developers with information to help avoid the boom-and-bust cycle that berberine seems to have undergone. The following five examples delve into the market potential at the intersection of science and social media.

Collagen

Collagen has had one of the more remarkable rises in popularity of all common supplement ingredients. Several sources of collagen exist, but almost all of them involve extracting the protein from waste streams of meat processing plants.

Proteins are rated using a tool called PDCAAS (protein digestibility-corrected amino acid score). This scale ranks proteins based on their amino acid profile using egg protein as the gold standard, which is given a PDCAAS score of 1.0. Collagen, which lacks the essential amino acid tryptophan, ranks 0.

That helped give collagen the reputation at one time of being a low-quality and low-cost protein ingredient that was only suitable as a quick-and-dirty way to plump up protein levels on labels. And it came from a not very palatable source, making it a harder sell for consumers who were becoming increasingly motivated by plant-based and sustainability messaging.

However, in recent years collagen has become a powerhouse in the beauty-from-within sphere. Collagen is one of the most searched terms in the social media space within the health and wellness arenas. Google Trends data show that interest in the ingredient has steadily grown in the past five years, with predictable spikes around each New Year's Day, a trend common to many better-for-you ingredients that might figure into consumers' resolutions about hoping to improve themselves.

What are consumers looking for with collagen?

Skin health is the No. 1 reason given by consumers for their curiosity about collagen.

The search term "anti-aging" is often paired in these searches.

Collagen is the most common protein within the body, where it performs many structural functions, including within the epidermis.

Collagen — in particular, its attendant peptides — has been shown to improve skin hydration, density, elasticity and roughness. By improving skin density, it has the effect of reducing wrinkles.

Whitney Bowe, a dermatologist with a large Instagram following upwards of 189,000 people, has posted frequently about collagen's benefits.

The hashtag #collagenbenefits has racked up millions of views on TikTok, with users posting dramatic before-and-after videos showcasing improved skin texture and reduced fine lines.

A second indication that has garnered a lot of social media activity is the use of collagen in performance nutrition applications, such as muscle and joint recovery from training sessions.

In addition, straight joint health applications – in other words, using collagen as more of an anti-aging ingredient without measuring the response to a training stimulus – have seen social media activity, as has the use of collagen for bone health.

Finally, a recent trend has seen collagen mentioned in connection with gut health, whereby influencers are citing some of the positive effects of the amino acids in collagen, such as glycine and proline, maintaining that they help support the intestinal lining, promote gut integrity and reduce inflammation.

Collagen science

Collagen is present in the market in several forms, from hydrolyzed collagen to ingredients purified down to specific peptides from suppliers such as Gelita, Nitta Gelatin and Rousselot.

Collagen has been a prolific field of study for nutrition researchers. For example, just since the start of 2022, more than 500 studies on collagen have been registered on the PubMed database maintained by the National Institutes of Health (NIH).

Skin health. The most well documented benefit for collagen has been for its role in skin health. Numerous clinical studies have demonstrated that hydrolyzed collagen peptides can improve skin elasticity, hydration and overall texture.

In 2023, the journal Nutrients published a meta-analysis using data gleaned from studies with 1,721 patients overall. The authors found the studies supported the conclusion that collagen supplementation can have positive effects on skin health.

A study published in 2024 that stretched over seven weeks found that 5 grams of collagen peptides daily improved skin elasticity and wrinkle visibility in a group of older women. Another recent study in the journal Food & Function found that a special type of collagen peptides processed with ginger improved skin elasticity better than standard collagen.

Another 2024 study, this one published in the journal Dermatology Research and Practice, found improved skin elasticity and hydration and a 44% reduction in collagen fragmentation in the dermis. The placebo-controlled study used a daily dose of 8 grams of hydrolyzed collagen.

Joint health. In terms of joint health, recent research has shown collagen's effectiveness in ameliorating osteoarthritis (OA) symptoms. A 2023 meta-analysis published in the Journal of Orthopaedic Surgery and Research looked at data from 507 subjects in four trials. It found a "significant difference in pain relief between the

Dermatologist on collagen and vitamin c

Whitney Bowe

28-second video – Click to watch

collagen peptide group and the placebo group in patients with knee osteoarthritis."

Another recent study published in the journal Cartilage found that the special form of collagen peptide used (referred to as "Type J") was as effective in relieving knee discomfort at a 2.5 gram dose, as was a 10 gram dose of standard hydrolyzed collagen.

An article published in 2022 by the Arthritis Foundation summarized the research, which is generally positive on collagen's effects on joint comfort for OA suffers (although it contains the caveat attached to almost all nutrition research – that more research is necessary). One study mentioned in the article was significant in that it compared collagen to glucosamine and chondroitin (longtime joint health mainstay ingredients) and to placebo. It found the collagen performed better than either of the other two groups.

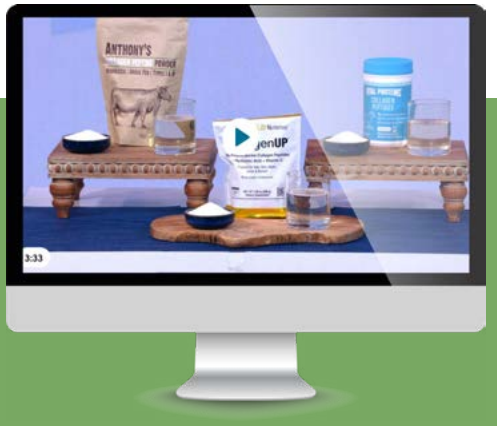
Bone health. Collagen isn't just important for skin and joints; it's also critical for bone strength. Collagen accounts for roughly 90% of the organic matrix of bones, providing structure and flexibility.

German collagen supplier Gelita has conducted studies on its Fortibone bioactive collagen peptide ingredient. The results have shown positive effects on improving and maintaining bone mineral density in a group of postmenopausal women.

Another recent study published in the Human Kinetics Journal found that collagen supplementation was effective in preserving bone mineral density in a group of elite cyclists. Because these athletes spend so much time on their bikes – which is a gentle activity in terms of bone stress and weight bearing – low bone density has been cited as an occupational hazard.

Gut health. In recent years, collagen peptides have been studied in connection to gut health parameters, which is perhaps the least well supported of the indications that influencers are sharing on social media. While many posts and articles can be found linking collagen with reduction of "leaky gut" parameters, numerous mainstream health authorities are still skeptical that "leaky gut" is a real condition.

However, a study done by Rousselot on one of its collagen peptides suggested an overall gut health benefit for healthy subjects. The results showed that 93% of the subjects, who were all healthy women, experienced a decrease in unpleasant gut symptoms, including bloating, during the period of the study.



'Worth the hype?': Collagen supplements

The new "GMA" (Good Morning America) series identifies trending items, such as collagen supplements, and explores if they are worth the buzz.

3:33-minute video – Click to watch

Ashwagandha

Ashwagandha (*Withania somnifera*) is a perennial herb native to South Asia that has been a mainstay of ayurvedic medicine for many centuries. The ingredient is considered an adaptogen, which is a substance that helps the body adapt to a wide range of stressors in nonspecific ways.

Recorded history of the ingredient's use goes back almost 3,000 years. The botanical has been widely cultivated for many centuries in India and elsewhere.

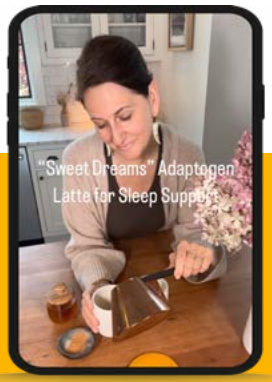
The main active component in the herb is a class of chemicals referred to as withanolides, which have been associated with anti-inflammatory and antioxidant effects. The ingredient is available in various forms, both extracts and whole plant powders. Though commonly sourced from the root of the plant, root and leaf extracts have also appeared on the market.

Like many medicinal herbs, ashwagandha is bitter and so is most often formulated into capsules, but gummies have also made inroads on the market.

Google Trends activity around ashwagandha has more than doubled in the past five years. Mentions of the herb have blown up on social media. At last check, more than 320,000 posts on the botanical had surfaced on TikTok.

Interest in the herb has been driven in part by the activities of one particularly well-funded Indian supplier, KSM-66 — one of the few ingredients mentioned by name in some of the social media posts.

More credible influencers like Yale-trained medical doctor and herbalist Aviva Romm have connected ashwagandha with relief of adrenal fatigue, such as in this webinar. And the herb has made it onto mainstream media shows as well.



'Sweet Dreams' adaptogen latte for sleep support

Dr. Aviva Romm

Instagram video — Click to watch

Ashwagandha, like some other legacy ingredients from traditional medicine systems, has a long history of use and a wealth of observational and anecdotal evidence.

The most searched indications for ashwagandha on social media include stress and anxiety reduction, improved sleep quality, enhanced physical performance, neuroprotective effects and male sexual aid — specifically as a testosterone booster.

Ashwagandha science

Ashwagandha, like some other legacy ingredients from traditional medicine systems, has a long history of use and a wealth of observational and anecdotal evidence. But clinical trials following the Western "placebo-controlled, double-blind" standard are far fewer.

Stress and anxiety. In this case, the most searched for benefit of ashwagandha — stress and anxiety support — also matches the best supported benefit of the ingredient.

A review published in 2024 in the journal Explore looked at data from studies totaling almost 600 subjects. The authors noted that the ashwagandha interventions showed positive results on stress and anxiety using measures such as the Perceived Stress Scale and the Hamilton Anxiety Scale, as well as measures of serum cortisol levels.

Sleep. A review published in 2024 in the journal Human Psychopharmacology suggests the outlook for ashwagandha and sleep is mixed. The authors found five studies that met their criteria for analysis, covering 254 subjects in total. They found evidence supporting ashwagandha's positive effects on sleep measures, including sleep onset latency (SOL), total sleep time (TST), sleep efficiency (SE) and the Pittsburgh Sleep Quality Index (PSQI). But the analysis found ashwagandha had no effect on two other sleep quality measures: wake after sleep onset (WASO) and total time in bed (TIB).

Performance. The research backing this possible ashwagandha effect is still developing. An Indian study published in early 2024 found that a daily dose of 600 mg of a standardized ashwagandha extract improved muscle strength and endurance compared to a placebo over an eight-week period. The study cohort

Had many questions about ashwagandha

Pranav Vyas

2:17-minute video — Click to watch

included both men and women between the ages of 18 and 45. All of the participants in both intervention and placebo groups took part in a weight training regimen.

A meta-analysis published in 2020 that assessed ashwagandha's effects on V02 max changes found only four smaller studies that met the inclusion criteria, covering 145 subjects in all. The authors said the studies showed that ashwagandha could improve this important measure of athletic performance, but the confidence factor was low because of high heterogeneity (i.e., differences in effectiveness across subjects) in the data.

Sexual function. While ashwagandha has often been mentioned in ayurvedic literature as an aphrodisiac and sexual performance aid for men, relatively little research along Western lines has been done on this indication.

One study that was structured along a Western, placebo-controlled model was published in 2024. For outcomes, the study used changes in a measurement tool called the Derogatis Interview for Sexual Function (DISF) questionnaire, as well as measuring serum testosterone and serum prolactin — a hormone which, at higher levels, is associated with erectile dysfunction.

The authors found that the ashwagandha intervention improved the DISF scores and increased testosterone levels. But no changes in prolactin levels were observed.

Mushrooms

The recent pique in interest in medicinal mushrooms mirrors that of the CBD craze a few years ago. Brands are piling onto a bursting bandwagon, and claims of all sorts are proliferating at a rapid rate.

What's more, crossover between the two ingredients has occurred. Pioneering CBD brand and market leader Charlotte's Web recently launched a line of mushroom gummies featuring some of the most talked-about species.

The uptick in attention is fueled in part by the growing awareness of psychedelic ingredients and their use in some kinds of psychological treatments. Those kinds of ingredients (most of which are not of fungal origin) are becoming more mainstream, with quasi-trade shows dedicated to them and some municipal and state laws now specifically making them legal. However, from a regulatory perspective, psychedelic ingredients most likely will end up in somewhat of a pharmaceutical positioning to be used under the care of a health care practitioner. This review will concentrate on ingredients that can be marketed as dietary supplements or functional foods.

The subject of mushrooms can be complex, as many species are involved, and they all have individual effects.

The labeling question

One issue that clouds the category is the ongoing disagreement about what the term "mushroom" should refer to. Some suppliers maintain it should refer to the fruiting body of the mushroom only, while others believe products made from the mycelium also meet the definition. The mycelium is the threadlike portion of the fungal organism that infiltrates the organic material being digested and from which the fruiting bodies arise.

While some labeling guidelines are in place from professional organizations such as the American Herbal Products Association (AHPA), the issue is far from being resolved to everyone's satisfaction. It complicates the question of which scientific results can be applied to back the effects of a given product, because the bioactive chemical profile could differ widely between a fruiting body product and one made with mycelium, even if both technically are derived from the same fungal species.

Gauging consumer relevance is similarly convoluted. Google Trends data using the search term "mushrooms" is not very revealing, as search activity has not varied much over the past five years.

Digging deeper into specific species is more illuminating. The search activity on the terms "reishi" (*Ganoderma lucidum*) and "shiitake"

(*Lentinus edodes*) has about doubled over five years. For "lion's mane" (*Hericium erinaceus*), it quadrupled.

But the search term "functional mushrooms" yields the most telling results of all. This search term was rarely employed even as late as 2021, and now its use has increased by almost two orders of magnitude.

The most popular medicinal mushrooms mentioned on social media sites such as TikTok and Instagram are lion's mane, reishi, chaga (*Inonotus obliquus*), cordyceps (*Cordyceps sinensis*) and turkey tail (*Trametes versicolor*).

The people who post about these mushrooms on those sites are most often talking about cognitive endpoints such as mood support and focus, as well as immune support and gut health. Some who post rave about the purported increased energy and athletic performance benefits they find with cordyceps use.

Among the prominent influencers sharing about mushrooms on social and traditional media are pharmacist-turned-natural-products-advocate Mona Vand, who has more than a million subscribers between Instagram, TikTok and YouTube. Her experience highlights one of the pitfalls of the whole social media

phenomenon for brand holders in the supplement industry. While her posts and others from influencers like her are driving increased awareness of the category, Vand already has a mushroom-infused coffee product on the market and is vying for market share on her own account.

Mushrooms are most often formulated into capsules, though their relatively muted taste notes make them easy to work with in food applications. Some mushroom extracts have bitter blocking tendencies, meaning they work well in functional coffees and teas.

Mushroom science

Given the broad range of species and products in this category, no more than a brief overview for each species will be given here.

During a session on functional mushrooms at the October 2024 SupplySide West (now SupplySide Global) trade show in Las Vegas, noted herbalist Roy Upton, DipAyu, founder of the American Herbal Pharmacopoeia, presented an overview of some of the potential properties of fungal ingredients. The list is exhaustive, and includes antibacterial, antifungal, anti-inflammatory and anti-hyperlipemic capabilities. Upton said various fungal species have been used to boost cognition, serve as neuroprotective and immune system modulating agents, and improve digestion. We will detail specific benefits as noted in the published literature for particular mushroom species below.

Reishi. By far, reishi has the greatest number of published studies among the functional mushroom species generating high consumer interest. In 2020, more than 4,500 studies on mushrooms were listed on the Science Direct database. By late 2024, that number had risen to almost 10,000.

According to Upton, reishi acts as an adaptogen, as well as having analgesic and anti-inflammatory properties.

Reishi has also been extensively studied for its anti-cancer and anti-tumor properties. While noteworthy, this information is of little use to the marketers of dietary supplements because cancer is a disease state and supplements cannot claim to treat or prevent diseases — by statute, only drugs can do so.

Cordyceps. Next up is cordyceps, which is the second-fastest-growing fungal species in terms of research volume. In 2020, Science Direct listed 351 studies; by late 2024, that number had risen to more than 5,200. Upton said this species has been studied for a variety of indications, including cardioprotective and hepatoprotective endpoints.

But social media enthusiasts seem most energized about the mushroom's purported energy-enhancing and sports performance benefits. Much of this seems to be anecdotal at this stage, but one recent study provided some of the first hard data to back these claims. The study out of Taiwan found greater muscle stem cell recruitment after exercise with cordyceps

Benefits of cordyceps and medicinal mushrooms

Josh Axe

3:51-minute video — Click to watch

supplementation, lending credence to claims that the fungal ingredient may boost post-training recovery.

Shiitake. This fungal species has seen a similar rise in research activity. In 2020, fewer than 200 studies were listed on Science Direct; by late 2024, that had risen to almost 3,300. Upton said this mushroom had been traditionally considered to be a purely culinary variety.

Social media posts have focused on the mushroom's immune-boosting and anti-cholesterol effects. Recent research provides some support for those claims. A recent study done in Brazil found a small but measurable cholesterol-lowering effect. A slightly older study done through the University of Florida found an immune-boosting effect for shiitake among a group of healthy young subjects.

Turkey tail. This species had the second-highest number of studies listed in 2020 on Science Direct (about 2,000) among the five species considered here. But it has shown the slowest growth in research interest, with that total rising to only about 2,700 by late 2024.

The primary active constituent in turkey tail that has generated research activity is polysaccharide K, commonly referred to as PSK. Almost all of the research on this molecule has been on its anti-cancer properties, with the cumulative results backing the inclusion of this fungal ingredient as an adjuvant therapy in some cancer treatment regimens.

As far as what's relevant to the dietary supplement sphere, social media patrons are sharing about the ingredient's possible immune system support and gut health benefits.

In the digestive health realm, a 2014 study verified turkey tail's prebiotic function. Another 2014 study mentions some of the mushroom's immunomodulatory effects, though in the context of cancer treatment.

Chaga. When looking at the number of studies on the Science Direct database, Chaga is the least studied of these five. In 2020, only 37 studies listed; however, in late 2024, that had climbed to 626. Traditional uses included alleviating gastric distress as well as use against cancerous tumors.

On social media, influencers are touting what they believe are the ingredient's antioxidant properties as well as immune support benefits and its use as an adaptogen. Little modern research has been done in humans to support these benefits, though.

Creatine

Creatine is a naturally occurring non-protein amino acid compound found primarily in red meat and seafood. Found primarily in the body's skeletal muscle, a small amount is also in the brain and testes.

Creatine is an integral part of the energy machinery of the cell. It helps maintain ATP (adenosine triphosphate) availability, particularly during maximal effort anaerobic sprint-type exercise.

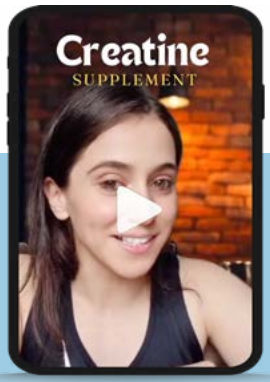
A normal diet supplying 1 to 2 grams of creatine daily results in muscle tissues that are about 60% to 80% saturated with creatine. Bringing those levels up to full saturation has been shown to have several benefits, including increased muscle size and strength gains.

Creatine is most commonly available in the form of creatine monohydrate. Other forms have come onto the market claiming various benefits but to date have not demonstrated functional advantages over the most common form.

Creatine is one of the older dietary ingredients on the market. The International Society of Sports Nutrition (ISSN) published its first position paper on the ingredient in 2007 and has updated it periodically since.

One issue with creatine supplementation over the years has been the high dosages involved. To most rapidly bring muscle tissues up to full saturation, ISSN recommends users take 20 grams of creatine daily in four doses. After this preloading period, which could last for several weeks, users can back off to a 5- to 7-gram daily dose, though athletes in competition or heavy training might consider taking more.

Another issue that plagues creatine supplementation is the number of myths that have cropped up around the use of the ingredient.



Fitness influencers be like 'Creatine = gains!'

Rumana Haaris

Instagram video – Click to watch

The messages on social media sites seem to closely mirror what the research has to say about the ingredient. This could be partly due to creatine's long history and rich trove of research results.

Those include that creatine fosters weight gain (it may lead to bigger muscles that retain more water) and that it is harmful to the liver.

Interest in creatine as measured by Google Trends data has risen steadily. The volume of searches on "creatine" is now about four times what it was in 2019.

The messages on social media sites seem to closely mirror what the research has to say about the ingredient. This could be partly due to the ingredient's long history and rich trove of research results. ISSN's promotion of research-based sports nutrition ingredients may also have played a role in boosting the messages with the best research evidence.

Social media users have largely concentrated their messages around improved exercise performance and accelerated muscle recovery. Another recent indication has cropped up, too: cognitive benefits in the form of enhanced clarity and focus, which seems to be one of the most popular things to say about any ingredient on social media – I feel so much more focused!

Creatine science. The best summary of research is provided in the aforementioned ISSN position paper, which was last updated in 2022. According to the authors, creatine has demonstrated to increase muscle mass and strength and to improve performance in high-intensity activities. Whether creatine supplementation helps endurance athletes is less clear.

The position paper also notes that creatine has roles in promoting recovery after exercise and in helping older consumers forestall the muscle wasting that can come with aging.

The purported cognitive benefits of creatine are the newest area of research in this well-studied ingredient. A study published in 2024 found a small benefit in creatine for cognitive performance as measured by standard cognitive tests. However, a systematic review published in mid-2024 found little evidence for cognitive benefits.

I took creatine for 60 days

Christian Nielsen

10:29-minute video – Click to watch

Electrolytes

Salt is one of the oldest – if not the oldest – nutrition items in the history of world trade, dating back to antiquity. Maintaining the body's electrolyte balance is such a basic health imperative that access to salt reserves or salt production areas (originally ponds near the sea coast) was of primary strategic importance to ancient societies.

While salt tablets were at one time standard for troops serving in tropical climes, salt and other electrolytes taken as supplements by the public at large is a more recent phenomenon.

In the mid-1960s the advent of the first Gatorade product on the market could be seen as the dawn of the electrolyte age. This first formula, created for the University of Florida athletic department (hence the "Gator" moniker), was a basic mix of sugar and salt with some citrus flavoring. The formula took advantage of then fairly new science around how carbohydrates sped up hydration in the gut. Making athletes sweat with two-a-day practices during summertime was once a standard for football coaches. More sweat meant more work, which yielded greater improvements.

Gatorade spawned a plethora of competitors, who were either competing on price or were claiming special advantages over the market leader. Some, like the Scratch products produced by Boulder, Colorado-based Scratch Labs, feature higher levels of salt and other electrolytes, which the company claimed was informed by analyzing the makeup of athletes' sweat.

I tested Amazon's top 5 electrolytes

Sten Ekberg

24:32-minute video – Click to watch

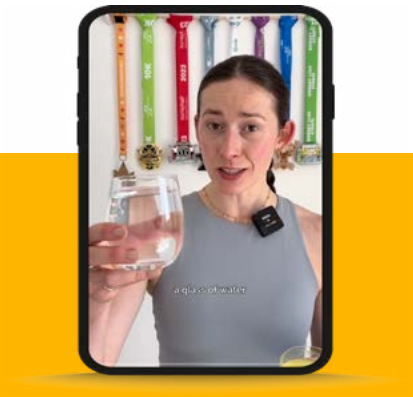
Sales of electrolyte beverages have increased rapidly in recent years. There is evidence that some consumers are using the products in lieu of sugary soft drinks or other beverages, apparently believing them to be a healthier choice. There is also reason to believe that some consumers view electrolyte drinks as a good choice when trying to recover from a hangover.

What social media contributors are saying. Social media posts about electrolytes have concentrated on improved hydration, better sports performance and accelerated recovery after exercise. And a few posters have also taken to suggesting that use of the products improves their cognition.

The most mentioned electrolyte ingredients in recent social media posts have been sodium, potassium, magnesium, calcium and chloride.

Electrolyte science. Recent research has sought to better quantify the effect of dehydration on athletic performance. One recent study used the accuracy of kicks among taekwondo competitors, finding that adequate hydration equated to better performance. Another recent study suggested a personalized hydration strategy could be more effective that a one-size-fits-all approach for athletes exercising in the heat.

Another recent study suggested that including amino acids in a hydration beverage rather than glucose could improve hydration and performance.



Water vs. electrolyes: The key differences explained

Siân Secc

1:23-minute video – Click to watch