Letter From the Editor:

With vacation season over and our schedules getting back on track, school and work are moving back up the priority ladder—for ourselves as well as those we work with. With this changing of the season often comes the typical cyclical scenarios we see at this time year after year. One scenario that comes to mind is the student athlete who has been training all summer and is now ready to “step up their game” through the use of supplements. This issue of SCAN Connection explores some potential performance enhancers commonly used in the athletic community to help you stay up to date and remain the expert on this topic. I have no doubt that you will be asked about at least one of these nutrients at some point over the next academic year, so be prepared to help educate on not only what these performance enhancers can do, but also how to choose a quality product and use it properly.

Further on the topic of supplements, in this issue we also take a look at some of the research findings out there regarding how diet and supplements may impact our microbiome. Targeting the gut microbiota with specific nutrients found in our diet and supplements has been shown to have a connection to disease, from both a prevention and treatment perspective. The abundance of microbial genetic information that makes up our body just may hold the secret to a disease-free existence!

Research like this continues to fuel advancements that allow us to educate others and offer nutritionally sound recommendations; however, every so often, the research gets misinterpreted and can lead to widespread distribution of incorrect information. It’s up to us, as the nutrition experts to correct these untruths, and that is exactly what PINES did this year at the ACSM Annual Meeting. Read about some of the sports nutrition myths that were dispelled in our spotlight article, and don’t forget to check out the resources section for additional opportunities to sharpen your nutrition knowledge. Let’s continue to show Adam and Jamie that they’re not the only “Myth Busters” around!

And now, it’s time to connect...

Rebecca Rivera Torres, MS, RD
Connection Corner

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Want to write for our newsletter? Have thoughts on something you read? Or, maybe you just have a great topic for an article you’d like to see covered? Connect with one of the Sports Dietetics-USA or Wellness/CV subunit section editors above today!

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Are you reaping all the benefits of your SCAN membership?

We have myriad resources available, including ready-made fact sheets to use with your patients; PULSE, our peer-reviewed publication; and continuing professional education (CPE) via PULSE, webinars, sessions at FNCE®, and Symposium. Go one step further and join our complimentary subunits to get more in-depth topic information and networking by accessing your My Profile area on SCAN’s website, scrolling down to Membership Details, and checking the boxes for any (or all!) of the subunits that interest you. And, what better way to network and discuss nutrition advances and best practices with other RDNs like yourself than to converse directly via our electronic mailing lists (EMLs)? Don’t forget, we’re social too! Like us on Facebook and follow SCANdpg on Twitter, Instagram, LinkedIn, and Pinterest. So, what are you waiting for? Be in the know and make your SCAN connections today!

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Hippocrates said, “All disease begins in the gut.” Since then, research has linked the microbiome and dysbiosis of gut bacteria to inflammatory bowel disease, irritable bowel syndrome, obesity, metabolic syndrome, and nonalcoholic fatty liver disease. The microbiota consists of all microorganisms living in or on the human body. Likewise, the genome represents the genes of the human. When looking at the microbiome and the genome combined, 99% of the genetic information is microbial, and only 1% is human.

There are hundreds of different species within the many bacterial phyla that exist in the gut microbiota. Two main phyla dominate the human gastrointestinal tract: Bacteroidetes and Firmicutes. Other nonbacterial organisms (viruses, archaea, and unicellular eukaryotes) also reside in the human gut; however, there is a greater understanding of how the bacterial species relate to health and disease.

The gut microbiota plays a role in the following:

- Production of short chain fatty acids (SCFAs) such as butyrate, which is the preferred fuel for enterocytes and is needed to maintain healthy tight junctions between cells.
- Production of the amino acids arginine and glutamine, which are also needed to maintain tight junctions.
- Synthesis of vitamins K and folic acid.
- Drug metabolism.
- Mental health. The brain-gut axis is a bidirectional communication system between the central nervous system and the enteric nervous system.
- Activation of regulatory T and other immune cells needed to maintain a healthy intestinal immune response. Around 70% of our immune system dwells in the gut-associated lymphoid tissue (GALT) of our digestive tract.
- Promotion of anti-inflammatory cytokines, which inhibit pro-inflammatory cytokines linked to disease.

Lower levels and poor diversity of the normal flora inhibit these metabolic roles and have been linked to chronic disease.

Scientists are gaining ground in understanding how specific bacterial species impact health. For example, we now know that, of the 2 main bacterial phyla, Firmicutes generates more harvestable energy than Bacteroidetes. Obese humans and rodents placed on a high-fat, low-fiber diet have higher ratios of Firmicutes to Bacteroidetes. Having a high level of Firmicutes to Bacteroidetes also disrupts short-chain fatty acid production and epithelial cell tight junctions. This can lead to insulin resistance, increased production of the hunger hormone ghrelin, entry of endotoxins into the blood, and metabolic endotoxemia. On the other hand, rodent studies have shown that targeting specific nitric oxide–producing bacteria lends itself to improved blood flow and cardiovascular health. For example, supplementing with inulin-type fructans promoted the production of nitric oxide–producing bacteria and may be a possible approach for preventing and managing metabolic dysfunction connected to cardiovascular disease.

Nutrition plays a major role in promoting gut eubiosis. A highly processed diet containing many food additives has been shown to induce gut dysbiosis. For example, maltodextrin, a common emulsifier or bulking agent, has been shown to promote adhesion of pathogenic organisms to the intestinal lining, causing “leaky gut” and increased disease susceptibility. Conversely, a whole-food, heavily plant-based diet encourages gut microbiota eubiosis, anti-inflammation, and healthy tight junctions.

In addition to eating a whole-food, heavily plant-based diet, some specific nutrients and supplements are showing promise for promoting a healthy microbiota that can, subsequently, have a positive impact on whole-body health:

- At the extraintestinal level, butyrate may have a positive effect on hypercholesterolemia, insulin resistance, and ischemic stroke. Non-digestible carbohydrates from oats, barley, and brown rice increase production of butyrate by the intestinal microbiota. Ghee (clarified butter) is also an excellent source of butyrate.
- Glutathione reduces oxidative stress, is needed for nutrient metabolism and the recycling of other important antioxidants, and regulating cellular events. Sulfur-rich foods support glutathione production.
• Deficiency of magnesium is common, negatively impacts the amount of probiotics in the intestinal tract, and leads to an inflammatory response. Supplements and increasing intake of magnesium-rich green leafy vegetables, nuts, and legumes may be needed.

• Omega-3 fatty acid supplements have been shown to increase the production of butyrate-producing bacteria in the gut.10

• High-quality probiotic supplementation with doses in the billions of colony forming units can be a useful temporary solution for gut dysbiosis. Prebiotic-rich foods, such as onions, garlic, bananas, and legumes, support the growth and survival of probiotics, further enabling their positive benefits.

• Newer high-bio-availability curcumin has shown efficacy in the treatment of gut dysbiosis and disease due to its anti-inflammatory, antioxidant, antiproliferative, and antimicrobial activities.12

Research is continuing to demonstrate how the microbiome can be influenced to reduce risk of disease within the gastrointestinal tract, as well as in the distant organs and systems. Currently the evidence supports the use of a whole-food, plant-heavy diet that is rich in non-digestible prebiotic fibers to promote gut microbiota eubiosis, with certain nutrients and supplements also showing promise in the treatment of dysbiosis and gut-lining dysfunction.

AUTHOR’S BYLINE

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REFERENCES

**Supplementally Sound**

by Briana Butler, RD

Athletes may or may not be getting everything they need through their diet, and even if they are, that does not mean there isn’t something else that can help their performance, as sports are an endless game of inches and seconds. Supplements can be used to fill in the missing gaps of a diet or serve as an ergogenic aid for improved performance. Why is that important for us as dietitians? With the extensive use of supplements and constant emerging research, athletes are bound to reach out to us about the latest and greatest. Also, wouldn’t we rather them come to us, a trusted nutritional professional, as opposed to Google or their next-door neighbor? In the long run, this may help attenuate the distribution of non-science-based recommendations and help keep our athletes safe. Therefore, it is crucial to be well versed in what is available and be able to provide sport-specific and individualized recommendations when the opportunity permits. While not an exhaustive resource, this article will take a brief look into some of the supplements often used by athletes.

**Regulation of the manufacturing and promotion of [supplements]... is still nonexistent.**

**LEUCINE**

Leucine is an essential amino acid that is known to play a significant role in muscle growth, power output, and muscle repair and recovery. Research suggests that muscle synthesis may be best maximized with the presence of this particular amino acid.\(^3\,6\,10\,13\) It can be found naturally in animal proteins such as beef, pork, and eggs, as well as in most protein powders. A wealth of studies indicate that an intake of 2 to 3 grams per meal and 20 grams per day for up to 6 weeks is ideal for ergogenic effects.\(^5\) Typically, I inform my athletes that they are likely to receive this amount in their meals but can also find it in many third-party tested protein supplements—an excellent way for them to maximize their gains.

**BETA ALANINE**

This particular amino acid, dependent on dosage, may lead to increased synthesis of carnosine, which buffers changes in pH, mitigating lactic acid build-up and potentially leading to delayed onset of muscle fatigue and decreased power output.\(^3\,4\,6\,9\) Essentially, it allows for the athlete to go harder for longer before fatigue noticeably sets in. There is a dose-specific protocol of 3.4 to 6.4 grams per day for 4 to 12 weeks, and onset of benefit typically occurs 2 to 3 weeks after initiation.\(^3\,4\,6\,9\) I have found this to be very helpful for my power athletes who are working to get stronger in the offseason. A noted side effect, however, is paresthesia with over 800 mg, so be sure to monitor dosing continually.\(^4\,6\)

**OMEGA-3 FATTY ACIDS EICOSAPENTAENOIC ACID (EPA) & DOCOSAHEXAENOIC ACID (DHA)**

These polyunsaturated fats boast an anti-inflammatory profile that can aid in recovery, muscle stiffness and soreness, heart health, and cognitive function, and potentially reduce side effects of brain injuries.\(^3\,6\,10\,17\) Further research suggests that EPA and DHA may also have the potential to increase endurance capacity.\(^11\,13\) Omega-3s are my go-to supplement, as their benefits cover a considerable scope of the needs of a demanding training regimen. For most athletes to see a benefit for inflammation, a recommendation of 2 to 3 grams per day is sufficient.\(^3\,6\,10\,13\)

**CREATINE**

Creatine has been shown to increase muscle work capacity and sustainability, leading to an increase in and maintenance of lean muscle mass.\(^1\,7\,10\,18\,19\) Although more research is needed, some research also implies creatine supplementation may reduce oxidative stress for total brain injury with longer recovery time projections.\(^5\,17\) For athletes looking to add muscle, a loading protocol of 20 grams per day for 5 to 7 days followed by maintenance dosing of 3 to 5 grams per day for up to 3 weeks after is typically followed.\(^1\,7\,10\,18\,19\)

**VITAMIN D**

This essential fat-soluble vitamin continues to grow in popularity, with supplementation benefits ranging from improved bone health, immune status, muscle recovery and function, cardiac function, and performance in high altitude environments. This is a nutrient that is particularly important for indoor sport athletes who may not get as much sun exposure and darker-skinned athletes who may be more subject to deficiency.\(^3\,4\,6\,10\,20\,21\) In cases of inadequacy, it is suggested to supplement with 2000 to 4000 IU/day of vitamin D2 or D3, with the latter being ideal due to potency.\(^20\,21\) With this vitamin, it is essential to first assess deficiency to determine the need for supplementation, as there is a risk for toxicity with high-dose supplementation. Vitamin D status assessment methods and recommendations continue to evolve.

**HERBS**

The use of traditional medicine in sports performance is understudied; however, there is research in place and emerging that supports the use of herbs and spices such as curcumin, chamomile, and ashwagandha. Curcumin, having the most robust research behind it, has been found to hold anti-inflammatory properties that may aid in the mitigation of delayed onset muscle soreness and tenderness at a split daily dose of 5 grams.\(^5\,10\,22\) Chamomile has been found to decrease anxiety, while KSM-66 ashwagandha root extract may reduce stress, fight inflammation, and increase endurance capacity.\(^22\) However, it is premature to provide dosage specific recommendations for the latter 2 herbs, and the primary goal is to encourage athletes to use fresh herbs and spices mainly for flavor enhancement in foods.
Protecting the Athlete

Athletes often seek athletic excellence and turn to supplements to help achieve their goals; however, regulation of the manufacturing and promotion of these products (the latter often done through social media, television, and peer propaganda) is still nonexistent. As a result, the potential for cross-contamination and inclusion of banned substances is increased, putting the athlete at risk for a positive drug test.

As nutrition experts, it is our responsibility when discussing supplements to do our due diligence beforehand and educate our clients how to make informed decisions when deciding to use supplements. In the athletic community at all levels, it is recommended to choose supplements that are third-party tested to reduce that risk. Third-party testing does not guarantee efficacy, but it gives the consumers peace of mind that their supplement has been reviewed by an independent organization to ensure it complies with safety, quality, and performance standards of the company, the US Food and Drug Administration, and the World Anti-Doping Association.

The most trusted third-party testing program is NSF International Certified for Sport®, which upholds the highest quality testing and boasts support from major professional organizations such as the MLB, NHL, NFL, LPGA, and PGA. However, the need to choose third-party tested products to decrease the risk for ineligibility and negative career impact begins long before one gets to the professional level. Therefore, collegiate athletes are a prime target for education on label reading, locating NSF-certified products, and keeping the lines of communication open with their sports dietitian in order to navigate the saturated world of supplements!

In all, as dietitians it is obligatory that we continually seek opportunities to learn about what is available to our athletes and how such supplements can impact them, whilst not devaluing the need to provide them with tools to be self-sufficient when making decisions on their own.

AUTHOR’S BYLINE

Briana Butler, RD, a former WNBA and FIBA basketball player, gained experience in sports dietetics through Southern Methodist University, EXOS, and the Dallas Cowboys. Currently, she works with professional and amateur athletes and sports performance facilities through her private practice BGB Nutrition Inc. (www.theathletitian.com; @bgbnutrition) and as a sports dietitian consultant for the NBA G-League Stockton Kings through Gatorade Sports Science Institute.

REFERENCES

PINES Busts Myths at 2019 ACSM Annual Meeting

By Nancy Clark, MS, RD, CSSD

Professionals in Nutrition for Exercise and Sport (PINES; www.PINESNutrition.org; @PINESNews) is a global network of sports dietitians from more than 37 countries. The organization provides a platform for sports dietitians to connect and share experiences, opportunities, and resources. Each year at the American College of Sports Medicine Annual Meeting, PINES organizes a fast-moving session with experts answering sports nutrition questions. The 2019 theme was "Myth Busters;" here are some of the busted sports nutrition myths.

**MYTH: Eating just before bed makes an athlete fat.**

*Mike Ormsbee, PhD, CSCS; Florida State University*

An athlete will not “get fat” by eating at night. The main problem with eating at night relates to the ease of overeating while lounging around and watching television. For some athletes, bedtime carbohydrates and protein can optimize recovery after a day with hard training or competing.

**MYTH: A gluten-free diet cures marathoners’ gut problems.**

*Trent Stellingwerff, PhD; Canadian Sport Institute Pacific, British Columbia*

If you have celiac disease (as verified by blood tests), your gut will indeed feel better if you avoid gluten-containing foods. However, nearly all gut issues for non-celiac athletes are probably not related to gluten but to foods that contain fermentable oligo-, di-, and mono-saccharides and polyols (aka FODMAPs).

**MYTH: Caffeine should be avoided due to its diuretic effect.**

*Ron Maughan, PhD; St. Andrews University*

We commonly see warnings to avoid tea, coffee, and cola because of the idea that they have a dehydrating effect and cause the body to lose even more water than normal. While this might be true with high doses of caffeine (>250 mg), people who regularly consume caffeine habituate and experience less of a diuretic effect.

**MYTH: The vegan diet is unlikely to support optimal performance in athletes due to lack of leucine to trigger muscle protein synthesis.**

*Nancy Clark, MS, RD, CSSD; Sports Nutrition Services LLC*

Without a doubt, vegan athletes can—and do—excel in sports. One key in having an effective vegan sports diet is to consume adequate leucine, the essential amino acid that triggers muscle protein synthesis. Swapping animal protein for plant protein can reduce leucine intake by about 50%.

**MYTH: Creatine is bad for your kidneys.**

*Eric Rawson, PhD, RD; Messiah University*

A review of 21 studies with creatine doses ranging from 2 grams per day to 30 grams per day for 1 day to 5.5 years indicates creatine is safe for young healthy athletes, as well as for the elderly. Recent studies using sophisticated methods to assess renal function also support that creatine supplements are well tolerated and not related to kidney dysfunction.

**MYTH: Females and males respond differently to popular sports supplements.**

*Louise Burke, PhD, APD; Australian Institute of Sport*

Limited research suggests both men and women experience the same ergogenic response to caffeine, but women do a better job of converting nitrate (such as in beetroot juice) to nitrite. Does that lead to a performance edge for women? Unknown. We need more research to give proper attention to this topic.

**MYTH: Exogenous ketone supplements provide the weight loss effects of ketogenic diets.**

*Brendan Egan, PhD, CSCS, Dublin City University*

Sports supplement companies have made commercial ketone-rich drinks for an alternative to a ketogenic diet. The drinks range in price from cheap to expensive, and in taste from tolerable to awful. Exogenous ketones do not mimic the effects of ketogenic diets because they blunt fat breakdown (lipolysis) and are generally co-ingested with carbohydrate.

**AUTHOR’S BYLINE**

*Nancy Clark, MS, RD, CSSD, (www.NancyClarkRD.com) is an active member of PINES and SCAN. The 6th edition of her popular Sports Nutrition Guidebook was released July 19, 2019.*
Resources and Events

Events to Connect with Colleagues and Learn

ONGOING/ON-DEMAND EVENTS

SCAN offers on-demand webinars
www.scandpg.org/educational-resources/webinars

CDR offers online continuing education modules in various areas
www.cdrnet.org/products/assess-learn-online-continuing-education-modules

IAEDP offers on-demand webinars
www.iaedp.com/webinars-schedule

Eating Recovery Center offers on-demand webinars
www.eatingrecoverycenter.com/professionals/on-demand-professional-development

Athletes and the Arts is looking for dietitians to get involved in this collaborative initiative to unite healthcare professionals and the performing arts community.
athletesandthearts.com

CONFERENCES

September 18-22, 2019
American Association of Cardiovascular and Pulmonary Rehabilitation (AACVPR) Annual Meeting, Portland, OR
www.aacvpr.org

October 1-3, 2019
Annual National Wellness Conference, Kissimmee, FL
www.nationalwellness.org

October 26-29, 2019
Food & Nutrition Conference & Expo™ (FNCE®) 2019, Philadelphia, PA
eatrightfnce.org

November 3-7, 2019
Obesity Week, Las Vegas, NV
obesityweek.com

November 8-10, 2019
Annual Renfrew Center Foundation Conference for Professionals, Philadelphia, PA
renfrewcenter.com/renfrew-center-foundation/renfrew-conference

November 16-18, 2019
American Heart Association Scientific Sessions, Philadelphia, PA

Resources to Connect with Your Patients

American Heart Association (AHA)
heart.org
If your patients know their most recent lipid levels and blood pressure measurement, they can use AHA’s CHECK. CHANGE. CONTROL. CALCULATOR™ at https://ccccalculator.cctracker.com to estimate their risk of a cardiovascular event in the next 10 years.

Diabetes Food Hub
www.diabetesfoodhub.org
The American Diabetes Association’s Diabetes Food Hub is a digital cooking and recipe platform to help people with diabetes address meal planning challenges. Users can drag-and-drop recipes into a weekly Meal Planner, which automatically calculates nutrition information, and create a shopping list. Nutrition facts are available for the recipes, including total carbohydrates, calories, fat, and protein.

Know Diabetes by Heart
knowdiabetesbyheart.org
The Know Diabetes by Heart professional education podcast series focuses on the link between cardiovascular disease (CVD) and type 2 diabetes. From the home page, search “podcast.” Topics include management/treatment of diabetes to prevent CVD, the 2018 Cholesterol Guidelines and implications for type 2 diabetes, and shared decision-making.

Million Hearts Initiative
millionhearts.hhs.gov
For clinician or patient resources and tools on cholesterol management, click on Tools and Protocols from the Million Hearts Initiative home page, then scroll down to Cholesterol Management.

Move Your Way Campaign
health.gov/moveyourway
Move Your Way promotes the second edition of the Physical Activity Guidelines for Americans. With resources for parents and adults, the website has factsheets, videos, and an interactive tool to build a weekly activity plan.