Nutrition Tips for Health and Athletic Performance Enhancement in Adults

By Peter Ronai, M.S., ACSM RCEP, CSCS-D
ACSM Program Director Certified

The theme of this issue of ACSM’s Certified News is Nutrition Tips for Health and Athletic Performance Enhancement. Our three feature articles will address: 1) nutritional strategies to prevent and manage diseases, 2) improve health, and 3) enhance athletic performance. The first two articles will address dietary approaches and the last article will examine the effects and purported benefits of five popular dietary supplements. Overweight (defined as a body mass index (BMI) of 25 to 29.9 kg/m²), obesity, defined as a BMI of ≥ 30kg/m², and diabetes (primarily type 2) are continuing public health problems in the United States (U.S.).

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A Question of Value
by: Richard Cotton
National Director of Certification

“Give a man a fish and you feed him for a day; teach him how to fish and you feed him for a lifetime.” – Lao Tzu

These are exciting times in the health and fitness field. Never before has the value of physical activity been more appreciated than it is now. There are numerous studies to support the health benefits reaped by exercisers versus sedentary populations. Exercise has been shown to be the one common thread for people who maintain weight loss.

It is time for ACSM to once again “Lead the Way” in the advancement of the fitness profession. Many of us may be frustrated by the depiction of fitness professionals in the popular media. We are often portrayed as either drill sergeants relentlessly pushing clients through impossible – if not dangerous – workouts, or bubble-headed, body-beautified huns hired by the rich and famous as status symbols because it is “cool” to have a personal trainer. These are some difficult images to overcome, but we can turn this around.

We must take a hard look at the value of the services that we provide as fitness professionals – thus the Lao Tzu quote as the lead this column. I certainly understand there is value in leading a client through a well-crafted workout based on the client’s health, fitness, goals, and preferences. What I challenge you with is this: Are you really providing the highest value of service possible?
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risk factors for coronary heart disease, type 2 diabetes, hypertension, dyslipidemia and metabolic syndrome. Recommendations for safe and effective weight loss and management from the American College of Sports Medicine (ACSM) include:

- Striving for long-term weight loss accomplished by incorporating modifications in both eating and exercise behaviors.
- Eating 500 to 1,000 fewer calories a day.
- Exercising 150 minutes a week initially and gradually increasing to 300 minutes a week and/or expending > 2,000 kcal/week of leisure activity.
- Reducing dietary fat intake to < 30% of daily calories.

Consulting with a physician or trained healthcare professional before engaging in a weight loss program.

Recently, the Institute of Medicine recommended that adults and children wishing to maintain a healthy BMI and prevent or manage metabolic syndrome engage in at least 60 and >60 minutes of daily, moderate level physical activity respectively. As previously mentioned, diabetes is also a major public health problem in the U.S. Approximately 23.6 million people or 7.8 percent of the U.S. population have diabetes, with 1.6 million new cases being diagnosed in 2007. Diabetes was the seventh leading cause of all U.S. deaths in 2006 and persons with diabetes are at two times greater risk of dying than people without diabetes. Common complications of diabetes include heart disease and stroke, hypertension, kidney disease, neuropathies, amputations, dental disease, other illnesses and complications of pregnancy. Total direct and indirect costs of diabetes was estimated to be approximately $174 billion in the U.S. in 2007. Monitoring and controlling blood glucose, blood lipids and blood pressure are just a few recommended strategies for preventing diabetic complications. Sound nutritional guidance is extremely important for maintaining a healthy weight, preventing or managing chronic diseases and enhancing athletic performance. Exercise professionals often receive questions concerning the ideal manipulation of macronutrients and the use of nutritional supplements for weight management, enhanced athletic performance enhancement and optimal health.

Exercise professionals best serve their clients/patients by educating them, providing them with current information and by making referrals to other members of their team who have proper academic training in clinical nutrition and dietetics. We are very fortunate to have three authors sharing their expertise with us in this issue of ACSM’s Certified News. Stella Volpe, Ph.D., R.D., FACSM, from the University of Pennsylvania will discuss nutrition and chronic diseases as it pertains to baby boomers. Erin Quann, M.A., R.D. from the University of Connecticut will discuss the effects of manipulating macronutrients (e.g., low-fat versus very low carbohydrate diets) composition on blood lipids and body composition in individuals engaging in resistance training.

In 1994, the Food and Drug Administration (FDA) passed the Dietary Supplement Health Education Act (DSHEA). The passage of this act has placed the responsibility for the safety of dietary supplements with the manufacturers, not the FDA. In addition, manufactures are responsible for labeling their products. This label however, does not need to provide the same details as packaged foods. The manufacturer, not the FDA, must conduct safety tests and evaluate statements and claims made regarding these supplements. This can contribute to consumer confusion and inappropriate use of certain dietary supplements. In 2005, dietary supplement sales represented a $200 billion industry. Julie Barrett, B.S., R.D., from the University of California San Diego will review some of the more popular dietary supplements for athletic performance enhancement and recovery. Each of the previously mentioned authors will highlight current concepts in nutrition and provide readers with practical and valuable information. I hope that you enjoy this issue!

About the Author
Peter Ronai is an exercise physiologist and Manager of Community Health at Aiblion Rehabilitation Centers/Brigham Hospital in Shelton Connecticut and an adjunct instructor in the Exercise Science Department at Southern Connecticut State University. He is the President of the New England Chapter of the American College of Sports Medicine and a member of the ACSM Publications Subcommittee. He is an ACSM Registered Clinical Exercise Physiologist, ACSM Certified Program Director, Certified Clinical Exercise Specialist, Certified Health Fitness Specialist, NSCA CGCS, and NSCA-CPT.

References
Two ACSM Certifications have new names.

ACSM Health/Fitness Instructor (HFI) will be ACSM Certified Health Fitness Specialist (HFS), and ACSM Exercise Specialist (ES) will be ACSM Certified Clinical Exercise Specialist (CES). The names change in the description of the certification in any way.

ACSM certifications are the oldest and most well-respected certifications for fitness professionals. In order to maintain our leadership status and provide the best possible services to ACSM certified fitness professionals, the ACSM’s Committee on Certification and Registry Boards (CCRB) determined that it was necessary to make some relatively minor yet strategically significant modifications to the ACSM Health/Fitness Instructor® and ACSM Exercise Specialist® certification titles.

The CCRB’s intentions in making the changes were to more clearly communicate the actual job of the given certification and at the same time, raise the customer’s perception of the certified instructor to a level that is consistent with the work they are performing.

For example, the use of “instructor” in “Health/Fitness Instructor” is frequently confused with a group exercise instructor, when in reality this certification is meant for fitness professionals who have the knowledge and skills to work with individuals who have had some health challenges, but are now cleared by their physician for independent physical activity.

It is much the same for our Exercise Specialist certification. The ACSM Exercise Specialist® is one of two ACSM clinical certifications. In some research that we conducted most consumers had the impression that an ACSM Certified Personal Trainer™ had more academic preparation than an Exercise Specialist. By adding “clinical” to the title, there is an obvious elevation of the title, that includes a more accurate description of the work of the given certified professional.

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Let’s look at the various types of fitness professionals currently working in the field, and the values they can provide:

THE CONSULTANT

Starting with the most basic trainer/client interaction, one would expect a fitness professional to be able to assess a client’s health, fitness, goals and preferences in order to develop and lead a client through a series of goal-specific workouts that result in improvements consistent with the client’s needs and desires. I would also expect a trainer delivering these services to be a good listener and encourage his or her client to exercise on their own, and avoid skipping any scheduled exercise sessions.

The client’s role in this relationship is, for the most part, passive. The trainer is the expert and the client is the recipient of services, which usually are comprised of exercise assessment, program design, attentive leadership and ongoing program modifications. In most settings, this trainer/client relationship accounts for the majority of current trainer/client services offered. In this model, deep communication is less likely, therefore limiting troubleshooting of exercise adherence challenges.

THE MOTIVATOR

These trainers do everything the above leader/consultant would do, only they have an additional focus on supporting their client in establishing a habit of lifelong physical activity. This trainer’s sessions would be more focused on teaching their client the fundamentals of exercise program development and progression. Instead of completely directing the exercise sessions, they would give the client the opportunity to provide input into the program progression and modification. After some set period of time, this successful client would not only experience results consistent with the program development goals and preferences, but they would also have an understanding of the program development and progression that got them to that point.

The role of the client in this setting is much more active, as they are learning and increasingly contributing as they learn. They also have a greater understanding of their own personal barriers to exercise, and can begin to have an arsenal of strategies in place for overcoming challenges. This training model may be in use by a minority of currently practicing trainers.

THE CHANGE AGENT

This is more of a vision of a trainer of the future. This trainer has all of the capabilities of the above-described trainers, as well as knowledge and skills in exercise behavior change that are as deep as their knowledge, skills and abilities to design and lead goal-specific exercise programs. This trainer has the knowledge and ability to apply advanced coaching skills, behavioral change techniques and strategies, perhaps apply concepts of positive psychology, appreciative inquiry and has knowledge of and the ability to use various adherence assessment instruments. This trainer will likely have advanced active listening skills and the ability to reflect both cognitive and emotional states back to their client.

For the most part, this trainer does not commonly exist today, or if they do they are likely self-taught or a graduate of one of the few university programs conducting research in these areas.

I return now to the frustration with the image of the overly-aggressive or “celebrity” trainers. In order for our profession to overcome this less-than-complimentary image, we have to provide an advanced level of service across the board— from club-based professionals all the way through those working as clinical professionals in hospital settings.

Bottom line: There can be tremendous value to very simple physical activity habits. In fact, the health of your country/the health of the world would dramatically increase if everyone just incorporated regular walks into their weekly routine. I understand there can be significant value to more comprehensive programming than walking alone, but the need for behavior change exists at all levels, from health-related fitness and exercise through advanced sports performance training. If we really want to make a difference and distinguish our profession from others competing with our growth and advancement, as well as overcome our less than optimal image, we need to advance our knowledge base.

The ACSM Committee on Certification and Registry Board (CCRB) is taking active steps towards the intentional evolution of our profession, just as the first ACSM certification committee did back in the mid-1970s with the development of the first industry certifications. In the short term, we will be offering even more continuing education opportunities. In the long-term, we will be integrating more behavioral competencies into ACSM certification exams.

I call on you as ACSM-certified professionals to look at the value of the services you are providing and consider enhancing your service or expanding your outreach, offering to truly support your clients in fully integrating physical activity as a lifelong commitment.

“Lead a client in a workout and you support him for a day, assist him in establishing a consistent exercise habit and you support him for a lifetime.”
Carbohydrate Restricted Diets and Resistance Training

A Powerful Combination to Enhance Body Composition and Improve Metabolic Health

Erin E. Quann, M.A., R.D., A.B.D.

Introduction

Individuals with a healthy body weight are now the minority, with two out of three people in the United States classified as overweight or obese. Increased adiposity is associated with poor body composition, dyslipidemia, hypertension, diabetes, inflammation, and a host of other chronic diseases. Most lifestyle and pharmacologic weight loss approaches that decrease fat mass (FM) also result in an undesirable loss of lean body mass (LBM). Lean body mass is important for maintaining physical performance, insulin sensitivity, and general metabolic health. Therefore, weight loss interventions that preserve LBM while reducing FM are preferred. The combination of caloric restriction and exercise can have a robust effect on improving body composition, but the type of diet and training program has a major influence on the magnitude of change.

Dietary Approaches

For more than three decades, official recommendations have emphasized reduced total fat, saturated fat, and cholesterol intake as the primary method to achieve and maintain a healthy body weight. There have been slight revisions over time and the recommendations have become even more conservative for fat intake for people at a higher risk. Many health professionals are taught to encourage plentiful intake of whole grain carbohydrates, fruits and vegetables, low-fat dairy, lean meats, and minimal fat. The food industry has created a plethora of products to help individuals meet low fat recommendations. The best estimates of nutrient intake in the United States indicate that percent fat intake has declined over the past three decades, with a concomitant increase in carbohydrate intake. During the same time, obesity and diabetes rates have increased and heart disease remains the leading cause of death in most industrialized countries. The recent report of the massive trial in the Women’s Health Initiative can only be described as discouraging with essentially no long term effect on weight loss or cardiovascular disease (CVD) on a low fat diet (LFD). In the area of weight loss, experiments continue to show that carbohydrate restriction is at least as effective as LFDs, usually more effective. In addition to weight loss, emerging research is showing that carbohydrate restricted diets (CRD) are an effective strategy to improve the metabolic syndrome (insulin resistance syndrome), which represents a group of seemingly disparate physiologic signs that indicate a predisposition to obesity, diabetes, and CVD. Consistent with the idea that an intolerance to carbohydrate (insulin resistance) is an underlying feature of the metabolic syndrome, research has shown that a reduction in dietary carbohydrate results in global improvement in traditional and emerging markers associated with this syndrome, particularly the diabetemabolic profile (high density lipoprotein cholesterol (HDL-C) is raised, small dense low-density lipoprotein cholesterol (LDL-C), triglycerides and apoB/apoA-1 are reduced). Interestingly, these same results are found even when body weight does not change, demonstrating that there are underlying mechanisms contributing to these favorable results independent of the effects of weight loss. The known metabolic effects of carbohydrate provide a mechanism for these results and an explanation for the seemingly paradoxical finding that a CRD leads to significant decreases in plasma saturated fatty acids despite increased saturated fat intake.

Thus, CRDs are at least as effective as LFDs for weight loss and are associated with better improvement in a broad array of cardiovascular risk factors, particularly those related to metabolic syndrome. In regard to body composition, the notion that macronutrient composition has a significant affect on fat loss and preservation of LBM during weight loss has been met with skepticism in favor of the paradigm “a calorie is a calorie”. The conclusions from a recent comprehensive review indicated that macronutrient composition strongly affects body composition. The meta analysis showed that diets lower in carbohydrate were associated with greater fat loss and diets higher in protein resulted in better preservation of LBM during weight loss, and the effects were independent of energy intake and participation in exercise. The physiologic mechanisms underlying the greater fat loss on CRDs (including isocaloric comparisons to LFDs) remain unclear, but reduction in insulin and greater reliance on fat oxidation for metabolic fuel likely plays a major role. Higher protein diets probably spare lean tissue during low calorie diets by providing a substrate for muscle protein and an anabolic signal as has been shown with the amino acid leucine. In theory, when carbohydrate is reduced it can either be replaced with protein, fat, or nothing. In many weight loss experiments, when subjects were asked to reduce carbohydrate they automatically reduced calories with little change in the absolute amount of protein and fat.
Of Gremlins, Prisms, and Choice

“Believe in yourself and you will be unstoppable.” – Emily Guay

What an inspirational statement! It evokes a sense of success and aspirations fulfilled. It is a simple concept to understand and yet difficult to achieve.

We can all list the reasons why we’re not reaching our full potential. Reasons like, “I can’t. I’m too . . .” These statements become a self-fulfilling prophecy and they are how we stop ourselves. This practice has many names: gremlin, saboteur, inner critic, disempowering thought, and negative self-talk to name a few. But they all describe the same thing: an internal voice that tells us we can’t be successful, we shouldn’t dream, we can’t change, we’re not qualified for the promotion, we have nothing to contribute, and on and on.

To be human is to have this internal voice, this gremlin. It does have a legitimate purpose; it protects us from risk. But in doing so, its voice often distorts opportunity. It creates insurmountable challenge where there is potential for growth. It prevents change even when the status quo is undesirable and unfurling. It makes us victors and robs us of choice. It links a fact (“I didn’t stamp an envelope.”) with a judgment about our capabilities (“I’m stupid and forgetful”) and it is activated by change.

As a coach, I am an agent of change. As a health and fitness professional, you are as well. You routinely help your clients implement lifestyle changes. And since gremlins are activated by change, you can expect your clients’ gremlin to show up periodically simply because they’ve hired you.

In addition, you have your own gremlin to contend with! Think about what happens when you face change – a promotion, a new facility, selling your services to a prospective client, an advanced certification. Does your gremlin remind you why you’re not the perfect trainer for the job, that you don’t have the ability to grow your business to the max, or that you’re not as smart as some of your colleagues?

Happily, you can learn to hear your gremlin’s voice and move beyond it. Although the method described here will work for anyone, I recommend you begin by getting acquainted with your own gremlin before introducing the concept to your clients. Once you become more practiced, you can choose to share this information and your observations with them if you wish.

Hear your true voice

First, identify what your gremlin is telling you about you. Listen to your internal voice and clarify the disempowering thought. Your emotion and accompanying body sensations are good indicators that your gremlin is active. Emotions like happiness, gratitude, or joy resonate in our bodies in a unique way. We may feel light, uplifted, open, or energized. In contrast, gremlin-speak feels distressful emotionally.

In addition, you may experience headaches, muscle aches, stomach upset, sweaty palms, a tight throat or clenched teeth.

When you hear your gremlin, pause for a moment. Examine what’s happening around you and inside of you. What emotion do you feel? What sensation? What is your gremlin saying about you?

Now that you can hear the gremlin’s voice clearly, you can distinguish it from your own – your true voice. Your true voice is capable of making a neutral observation about circumstances without linking them to a judgment about you. Notice that both voices exist in your head and, just like it’s impossible to listen to two conversations at one time, it’s equally impossible to hear your true voice speaking if all you can hear is your gremlin.

Identify your gremlin’s perspective

Your gremlin doesn’t stop with a simple judgment about you. It validates that judgment by giving you a perspective about some aspect of your life. When you unconsciously accept that perspective as “the way things are,” you become stuck. The perspective becomes “The Truth.”

Here’s an example: Let’s say your gremlin says you are an ineffective salesperson, a trainer destined to always struggle. This belief is powerful, and chances are good that every time you approach a prospective client you are already convinced they are not going to hire you. When they don’t, they simply re-confirms what you already know. Now your experience confirms your belief. It also generates your perspective about selling personal training: it’s hard, or scary, or impossible, or a struggle, or something you will never master.

Regardless of your description, this is your gremlin’s perspective! And until you make this perspective conscious, your gremlin will continue to run the show.

The Power of Choice

You can choose to approach selling (or anything, for that matter) from many different perspectives. Think of perspectives as the facets of a prism. Depending on which facet you look through, the world looks different.

Now, here’s the great part: You get to choose your perspective and it doesn’t have to be the one that your gremlin wants!

Playing with perspectives begins with brain-storming. It can be fun and is always enlightening. When you brainstorm, hold nothing back. Write down every idea that comes to you no matter how far-fetched and implausible. You’re not obligated to choose any of them and they will prime your creative juices.

Let’s say your current perspective on selling personal training is, “it’s hard.” Alternative perspectives could be: it’s easy, it’s a game, it’s fun, or it’s a great way to meet people. Or, you can really think out of the box and ask yourself, “What would my pet’s perspective be? Or what would a red perspective (or your favorite color) look like? Or what perspective does a successful trainer use?” (Ask one to find out!)

Any of these perspectives will shift the prism, permitting you to see what you could not see before because your gremlin was blocking the view. Make a list of every perspective you identify and then examine them in more detail. Notice which resonate with your true voice? Which feels like a good fit? Ask yourself, “If this was my perspective, what would I be saying “yes” to and what would I be saying “no” to?” This will help you clarify all the perspective has to offer.

Choose a perspective that feels right and commit to using it for a week or two. As you experience it, notice how it feels in your body and what emotions it evokes. Notice how it changes things, either the process of doing something or the outcome. You may continue to hear your gremlin’s voice, but now that you recognize it for what it is you can begin to move beyond it. Be sure to remember that no perspective is “The Truth.” Although any perspective may be true for you, they are simply one facet of a multi-faceted prism, a specific way to examine, explore, and experience an aspect of our life.

Learning to hear and move beyond your gremlin is well worth the practice, and consciously choosing perspectives that resonate and nurture will offer you freedom to grow. Ultimately, the opportunity waiting for you is a life that fulfills and makes you alive. It’s your choice.

About the Author
Heidi Duskey, M.A., is an ACSM Certified Health Fitness Specialist and has worked in the fitness industry for over 15 years, holding club management positions in fitness, membership, and program development. Sparked by a keen interest in human behavior and learning, she transitioned into coaching in 2005 earning credentials from Wellcoaches and The Coaches Training Institute. Underpinning Heidi’s work today is her curiosity about how people successfully adopt sustainable, healthy behaviors and her passion to effectively support this process. She currently maintains a private coaching practice, walks as a seasoned racewalker. Heidi can be reached at heidi@coach4zest.com.
Carb Diets... Continued from Page 4

In isocaloric (similar caloric value) experiments, several investigations have found positive improvements in body composition and blood lipids by reducing the ratio of carbohydrate:protein. Although the preponderance of evidence indicates that CRDs are associated with greater fat loss than LFDs, there is virtually no information on the ideal quantity and quality of protein and fat in the context of a CRD. Our laboratory group has performed several hypocaloric CRD studies (carbohydrate 10-12% of energy). Typically protein intake is between 25-30% of energy and we generally find that about 60-70% of the total weight loss is attributed to fat loss. In a recently completed study we had subjects consume our typical very CRD except they added a high protein supplement two times per day, resulting in a slightly higher protein intake. The men consumed a hypocaloric diet on total weight loss are equivocal. As shown in a recent study, exercise alone results in more favorable body composition changes than a CRD alone. The combination of endurance and RT was the most favorable response for both FM and LBM (Figure 2), suggesting this may be a logical effective intervention strategy for weight loss in middle-aged women.

Volek et al. performed a similar experiment in forty seven overweight men who restricted either fat or carbohydrate with or without RT for 12 weeks. They consumed either a LFD instructed to be 10:30:60; %carbohydrate:protein:fat or a very low carbohydrate diet (40:30:30; %carbohydrate:protein:fat) resulted in more favorable body composition changes than a LFD (55:15:30; %carbohydrate:protein:fat). Protein intakes were 0.8 g/kg protein in the LFD group versus 1.6 g/kg protein in the moderate CRD group. Both groups significantly decreased their total caloric intake by approximately 600 kcal from baseline, with no significant difference between the two treatment groups. After 16 weeks, the CRD group lost approximately 2.0 kg more than the LFD group (mean ± SEM; 9.3 ± 0.8 kg vs. 7.3 ± 0.5 kg, respectively). The addition of a resistance exercise program (EX), including 5 d/wk walking and 2 d/wk RT, to a high protein, moderate carbohydrate diet had synergistic results. While the exercise treatment did not significantly affect weight loss, all groups lost a significant amount of weight during the sixteen week intervention. The CRD + EX group had the largest weight reduction (11.2%), where the LFD alone group had the least change in body weight (8.4%). Decreases in FM (measured via Hologic dual energy X-ray absorptiometry; DXA) were positively correlated with higher protein intake and exercise. The most favorable responses were seen in the two CRD groups who lost an average of 7.3 ± 0.8 kg of FM (4.3% relative body fat), where the two LFD groups lost an average of 5.3 ± 0.3 kg of FM (2.9% relative body fat). When comparing the two exercise groups, independent of diet treatment, those participants who received supervised training lost an average of 1.7 kg or 2.2% more than those who were less physically active. In regard to LBM, protein and exercise also induced the greatest preservation, where the LFD resulted in the greatest loss of muscle mass during weight loss. The combination of a CRD and exercise had the most favorable response for both FM and LBM (Figure 2), suggesting this may be a logical effective intervention strategy for weight loss in middle-aged women.

Volek and colleagues performed a similar experiment in forty seven overweight men who restricted either fat or carbohydrate with or without RT for 12 weeks. They consumed either a LFD instructed to be about 55:15:30; %carbohydrate:protein:fat or a CRD instructed to be 10:30:60; %carbohydrate:protein:fat. This was a free-living study and subjects were not required to count calories, however both groups reduced their intake by approximately 600 kcal from baseline. A cohort of subjects from each diet group were randomized to perform heavy RT 3x/wk. The program incorporated free weight and machine exercises for all major muscle groups and used a non-linear periodized progression. To optimize the available nutri-

Figure 1

Kraemer et al. 1999

Figure 2

For the average person, choosing dietary supplements can be a daunting task. Supplement retailers provide a multitude of options and market their products as beneficial to people of various ages and activity levels. Some compounds are sold as a single nutrient and some are combined with other nutrients due to purported synergistic benefits. Your local vitamin and health food stores carry supplements that claim to increase lean body mass, promote anabolism (growth), repair muscle tissue, resist muscle fatigue, increase fat metabolism sparing glycogen stores, boost immunity, and improve muscle strength, power, and endurance. The need and/or benefit of many dietary supplements should be determined on an individual basis and discussed with a physician and/or registered dietitian.

When approached by clients or patients it is important to inform them that supplements are not regulated or standardized by the Food and Drug Administration (FDA) and that a substance labeled “all natural” does not mean it is safe. There may be negative side effects associated with supplements and they may also contain other substances not listed on the label.

The purpose of this article is to review some of the more popular dietary supplements for performance and recovery, including an antioxidant compound that has recently sparked the interest of researchers in its ability to improve performance. The effects and purported benefits of caffeine, creatine, glutamine, glucosamine and quercetin are presented.

**Caffeine**

Caffeine, consumed mainly as coffee, tea, soda, and chocolate, is the most widely used stimulant. It is well known for stimulating both the central nervous and cardiovascular system, increasing alertness, energy, and ability to concentrate. Supplement companies market caffeine as beneficial to anyone who wants to increase their energy for high-powered workouts and delay the onset of muscle fatigue, while caffeine anhydrous is purported to increase mental alertness. If consumed in excess, caffeine is known to induce negative effects such as anxiety, restlessness, insomnia, and rapid heart rate. It also acts as a diuretic and can lead to dehydration without adequate fluid intake.

Caffeine is thought to promote fat metabolism during exercise, however the literature does not fully support this claim. Although mobilization of fatty acids occurs, net fat oxidation is unchanged by the ingestion of caffeine. Many studies have concluded that caffeine does enhance athletic performance. A meta-analysis of 40 double blind studies using dosages from 5-10 mg/kg of body weight, concluded that compared to placebo, caffeine improved a number of test outcomes (e.g., VO2max, perceived exertion, and time to exhaustion) by ~12% with the greatest improvements seen in endurance exercise rather than short-term or graded exercise. Dosages as low as 2mg/kg and 3mg/kg of body weight have also been suggested to promote ergogenic benefits by improving cycling time by up to 4%. In order to get the buzz needed to stimulate a workout or to power through a tough training day, natural sources of caffeine such as coffee or tea provide ample amounts to obtain ergogenic benefits. The chart below shows the caffeine content in a variety of widely available beverages. In addition to caffeine, some of these popular so-called energy drinks contain up to 4g sugar per fl oz. whereas plain coffee and tea have none.

**Caffeine Content of Popular Beverages**

<table>
<thead>
<tr>
<th>Beverage</th>
<th>Caffeine (milligrams)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plain coffee, brewed, 8oz.</td>
<td>95</td>
</tr>
<tr>
<td>Espresso, 1 fl oz.</td>
<td>64</td>
</tr>
<tr>
<td>Black tea, brewed, 8oz.</td>
<td>47</td>
</tr>
<tr>
<td>Green tea, brewed, 8oz.</td>
<td>30-50</td>
</tr>
<tr>
<td>Coke, 12oz.</td>
<td>35</td>
</tr>
<tr>
<td>Diet Coke, 12oz.</td>
<td>47</td>
</tr>
<tr>
<td>Red Bull, 8.3oz.</td>
<td>76</td>
</tr>
<tr>
<td>Rockstar, 16oz.</td>
<td>160</td>
</tr>
<tr>
<td>Full Throttle, 16oz.</td>
<td>144</td>
</tr>
</tbody>
</table>

**Creatine**

This amino acid metabolite is synthesized by the body from glycine, arginine, and methionine, and has long been used as an ergogenic aid in both amateur and professional athletes. Ingesting dietary sources of creatine from beef, tuna, cod, herring, and pork, provides the average meat eater about 1-2 g/day. Supplement companies have suggested doses of creatine for maximal benefit range from 5-25 g/day. However, these doses have not been scientifically evaluated. Supplement labels claim that creatine is converted to phosphocreatine in the human body, which helps to fuel skeletal muscles and provides support for immediate energy...
Popular Supplements... Continued from Page 7

production during high-intensity workouts. Exogenous creatine has been suggested to enhance intracellular phosphocreatine stores without any effect on ATP levels, however it does increase myoblast fusion and myotube formation, an important step in muscle formation that may reduce time for muscle recovery11. Several studies have reported ergogenic benefits from creatine supplementation including increased total lean body mass and improved performance in high-intensity, short duration, repetitive tasks, such as lifting weights, after 4-6 days of loading 15-20 g/day1,2. Researchers have reported that creatine supplementation has increased lean body mass by 2.2% ± 0.7%, however this outcome is highly controversial. Additionally, performance in short duration repetitive tasks was shown to be improved by 6.4% ± 0.8%3, however these findings have not been consistent. A number of supplement labels also claim that creatine may help promote cellular hydration, however, studies examining the effects of supplementation on thermoregulatory response have had mixed results. While researchers agree that the osmotic effects of supplementation on thermoregulation during exercise have not been evaluated to date. Anyone who decides to include creatine supplementation in their regimen should first consult their physician or qualified nutrition professional (e.g. Registered Dietitian). For more information on creatine, please visit: www.nlm.nih.gov/medlineplus/druginfo/natural/patient-creatine.html

Glutamine

Glutamine is a conditionally essential amino acid that is involved in many metabolic processes in the human body. It serves as an important fuel for lymphocytes and macrophages, key cells of the immune system, while also playing a role in glucocorticoidogenesis, the conversion of alternate metabolites to form glucose for energy when glycogen stores become depleted. Glutamine may become essential during conditions when glutamine catabolism occurs at an increased rate, such as trauma, starvation, infection, and untreated diabetes mellitus. During prolonged or high intensity exercise, muscle and plasma glutamine concentrations decline and remain depleted during recovery13.

Researchers have attempted to link decreased plasma glutamine with immune function due to the high rate of upper respiratory tract infections in over-trained athletes. During exercise, glutamine is released from the muscle to be supplied to target tissues and to maintain normal blood concentrations as they would under catabolic stress. Therefore it has been proposed that reductions in glutamine may be a result of muscle damage4. Immune cells that migrate to muscle tissue for repair have an increased rate of glutamine uptake, thereby reducing concentrations in the muscle. Although many researchers have concluded depressed glutamine in over-trained individuals is associated with increased incidence of upper respiratory tract infections, a review of literature concluded that there is not a clear cause and effect connection11.

Glutamine has become a popular sports supplement consumed for purported ergogenic benefits of increased strength, quicker recovery, and decreased frequency of respiratory infections; all potential consequences of over-training. The role of amino acids in the synthesis of protein leading to building lean body mass is one mechanism by which glutamine is suggested to increase strength and support quicker recovery. However, glutamine supplementation of 0.9mg/kg lean muscle mass/day combined with 6 weeks of strength training demonstrated no changes in multiple strength measurements and no gains in lean body mass compared with strength training alone4.

Glucosamine

Glucosamine is a naturally occurring amino monosaccharide, found in connective and cartilage tissues. Supplementation with this compound has become popular for people of all ages who participate in regular physical activity due to the theory that increased physical activity may be associated with degenerative processes to articular cartilage4. Pharmaceutical companies claim glucosamine supplementation provides support of tissue and joint function, promotes joint flexibility and mobility, and helps rebuild cartilage and lubricate joints.

This compound has been extensively evaluated as a prevention and/or treatment of osteoarthritis (OA), a form of arthritis characterized by erosion of articular cartilage resulting in pain and loss of function. Several randomized control trials (RCTs) have evaluated the efficacy of glucosamine supplementation in the prevention and treatment of osteoarthritis, however results have been inconclusive5. Both animal and human studies have suggested that glucosamine may slow the progression of OA and may reduce pain associated with degradation of cartilage, however insufficient evidence exists to demonstrate clinical benefit5. The Glucosamine/Chondroitin Arthritis Intervention Trial (GAIT), a large, multi-center RCT funded by the National Institutes of Health, evaluated whether glucosamine, chondroitin sulfate, or a combination of both were effective in the treatment of pain associated with OA of the knee. Results suggested that supplementation had no significant effect when compared to placebo6.

Quercetin

This flavanoid found in apples, onions, and berries has primarily been evaluated for its antioxidant properties and its role in reducing the risk of certain cancers. More recently it has also been investigated for its potential benefit to athletes and those engaging in regular exercise. Exercise has been documented to increase the production of reaction oxygen species (ROS), which may eventually lead to the development of chronic diseases associated with oxidative stress, such as atherosclerosis, hypertension, and cancer. While the benefits of regular exercise outweigh the acute oxidative stress, it has been suggested that antioxidant supplementation may enhance the body’s defenses against ROS5.

More recently, researchers have proposed a potential ergogenic benefit of quercetin supplementation. Evidence from animal studies suggest that quercetin stimulates glycogenolysis and oxygen consumption with concentrations of 50mM-300mM. These effects were attributed to its action on mitochondrial energy metabolism, specifically the uncoupling of oxidative phosphorylation6. In human trials, 6 weeks of antioxidant supplementation with quercetin significantly improved high-intensity cycling performance through enhanced power output compared to antioxidant supplementation without quercetin11. Further studies are needed to determine if quercetin alone has similar effects rather than combined with other compounds that may be providing a synergistic effect.

Summary

The supplements discussed above have been marketed as providing ergogenic benefits or providing protection from the stress of exercise on the human body. Since the FDA does not regulate dietary supplements, health and sports nutrition professionals must critically evaluate the efficacy of their recommended use.

In order to appropriately fuel the body for exercise and recovery, the average person...
Nutrition and Physical Activity for Baby Boomers

Stella L. Volpe, PhD, RD, LDN, FACSM

Definition of Baby Boomer
The term “baby boomer” is used to describe an individual who was born between 1946 (post World War II) and 19641-2. Presently, that would include individuals who are about 43 to 62 years of age. The reason they are called “baby boomers” is due to the surge in birth rates during that era. With aging, come many changes, negative and positive. Nutrition and physical activity can help to stave off some of the negative changes, and as with any age, both play key roles to promoting and maintaining overall health. This article will present some ideas on “baby boomer nutrition and physical activity.”

Evaluating People’s Concerns about Nutrition
The first step is to evaluate how much baby boomers care about nutrition and physical activity. In a survey conducted by the American Dietetic Association: Nutrition and You: Trends 20003, they reported that, as the baby boomer generation approaches the age of 50, they have increased concerns about their diet and nutrition. Based on their survey, of people’s attitudes, beliefs, knowledge, and practices related to food, nutrition, and health, they labeled people into three distinct categories: “I’m Already Doing It,” “I Know I Should, But…,” “Don’t Bother Me.” Those who stated they are “already doing it” comprised about 28% of those surveyed and state they already have made significant changes to their eating behavior and are eating healthily. The “I know I should, but…,” which comprised 40% of those surveyed, said that they know what comprises a healthy diet, but for some reason, have not made changes toward eating healthily. Those individuals who said “don’t bother me” may or may not know about healthy diets, but do not seem to be concerned about their intake. About 32% of those surveyed comprised this category4.

Table 1 indicates the changes in people’s attitudes about diet and nutrition from four previous American Dietetic Association surveys, as well as the 2000 survey.

What’s Next?
Though the above information provides an estimation of the general population’s attitudes toward diet and nutrition, as a practitioner, the first step would be to find out your clients’ attitudes and goals, which is common practice for clients of all ages. Baby boomers, however, have needs that are specific to their age group, and these needs will be discussed below.

Sarcopenia, Diet and Exercise
Sarcopenia, which refers to a complex, multifactorial progression of muscle loss, is typically facilitated by a combination of consumption of a less healthy diet and a sedentary lifestyle5. There have been reports that low-grade chronic inflammation can also contribute to the progression of sarcopenia6.

It has been reported that, on average, after the age of 40, muscle mass decreases by about 0.5% to 1% per year5. Note, that this represents an average loss, and can be attenuated in individuals who have been exercising (including weight training) and/or who begin to exercise.

In addition to weight-bearing exercise (i.e., walking, jogging), a slight increase in the consumption of protein can help to prevent the large decline in muscle mass. The Recommended Dietary Allowance (RDA) for protein is 46 and 56 g/day for women and men 31 years of age and older, respectively. To date, however, there is not enough scientific evidence to suggest how much more protein a person should consume. Keep in mind, however, that many Americans already consume above the RDA for protein, though it has been reported that older Americans consume below the RDA. Regardless, the goal for your clients may be not to increase protein intake, but to alter protein intake to include more high biological value sources (or to increase both total and high biological value protein sources, if initial protein intake is too low). High biological value protein contains the essential amino acids required by humans. In addition, if two protein foods of lower biological value are consumed and together comprise all of the essential amino acids, these two sources, consumed together, would be considered as high biological value protein. Sources of high biological value protein include: eggs (or just egg whites if fat and cholesterol intake are a concern), lean fish (e.g., bass, sole, haddock or cod), lean meat and low-fat dairy foods. Low biological value foods are mostly found in grains, seeds, vegetables, plants, and legumes. These are excellent foods that should be included in the diet, despite the fact that they are of lower biological value (See Table 2).

It is essential to note that there is little substantiation that a high protein intake increases the risk of kidney disease in healthy adults; nonetheless, kidney function does decrease with age. Thus, it is important that kidney function is also evaluated prior to recommending increased protein intake. Nevertheless, increasing higher biological value protein intake, even when protein intake may need to be lowered (as is usually the case with kidney disease), is still beneficial.

It is clear that the combination of a healthy diet, that includes high biological value protein, and physical activity, that includes weight bearing and/or resistance exercise, can help to prevent the high rate of sarcopenia in baby boomers7-8. Though exercise and good nutrition are key, frailty, disability and disease can greatly decrease or prevent a person from being physically active as they age. In this case, physical activity (i.e. type, intensity) would need to be adjusted if any can be performed, and greater attention would need to be paid to dietary intake.

Table 1. People’s Attitudes and Behaviors for Diet and Nutrition

<table>
<thead>
<tr>
<th>Categories</th>
<th>1991</th>
<th>1993</th>
<th>1995</th>
<th>1997</th>
<th>2000</th>
</tr>
</thead>
<tbody>
<tr>
<td>“I’M Already Doing It”</td>
<td>26%</td>
<td>23%</td>
<td>24%</td>
<td>26%</td>
<td>28%</td>
</tr>
<tr>
<td>“I Know I Should, But…”</td>
<td>38%</td>
<td>42%</td>
<td>36%</td>
<td>34%</td>
<td>40%</td>
</tr>
<tr>
<td>“Don’t Bother Me”</td>
<td>36%</td>
<td>35%</td>
<td>40%</td>
<td>40%</td>
<td>32%</td>
</tr>
</tbody>
</table>

Adapted from reference #5.
**Nutrition and Physical... Continued from Page 9**

#### Table 2. Biological Value of Specific Foods*

<table>
<thead>
<tr>
<th>Food</th>
<th>Score (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Whole Egg</td>
<td>100</td>
</tr>
<tr>
<td>Whole Soy Bean</td>
<td>96</td>
</tr>
<tr>
<td>Cow’s Milk</td>
<td>91</td>
</tr>
<tr>
<td>Cheese</td>
<td>84</td>
</tr>
<tr>
<td>Rice</td>
<td>83</td>
</tr>
<tr>
<td>Fish</td>
<td>76</td>
</tr>
<tr>
<td>Beef</td>
<td>74</td>
</tr>
<tr>
<td>Tofu</td>
<td>64</td>
</tr>
<tr>
<td>Whole Wheat</td>
<td>64</td>
</tr>
<tr>
<td>Whole Flour</td>
<td>41</td>
</tr>
</tbody>
</table>

*Whole egg is given a value of 100, based on nitrogen retention (a measure of proteins incorporation in the body)


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**Other Factors to Consider**

There are many issues to consider with training and/or counseling clients, and these include: overall goals, time constraints, family obligations, work, gender, race, ethnicity, socioeconomic status (SES), etc. The first thing to remember is to not have pre-conceived notions of a person’s fitness levels or goals, just because they are a baby boomer. Over the years, including most recently, many individuals in the baby boomer category are still competing in sports at elite levels.

Maitland and colleagues evaluated the association of nationality and race with anthropometry, nutrient intakes, health history and SES of peri-menopausal women (40 to 55 years of age). In comparing black (Caribbean and African American) and white women, both groups had similar mean ages, education and SES. All participants did not meet the Dietary Reference Intakes for calcium and iron, yet they consumed more energy than needed. More blacks were above the anthropometric recommendations and more whites had a greater calcium intake, yet reported more depression. With these varied results, it is important that nutrition counseling and exercise training are appropriately matched.

In addition, obesity rates earlier in life have been reported to be greater in the baby boomers compared to their “silent generation” counterparts (born from 1926 through 1945). Though there were no differences in the prevalence of arthritis between the birth cohorts, the relative risk of arthritis increased over time, due to the greater rate of obesity in the baby boomers. Greater rates of obesity and arthritis may require very different exercise and eating patterns, compared to those discussed previously to prevent sarcopenia.

**Health Tips for Baby Boomers**

Some general tips for baby boomers include:

- Be active each day for at least 30 minutes. Physical activity should include some type of aerobic activity (e.g., walking, running, swimming) and some type of resistance training (e.g., weight training, Pilates)
- Consume proteins of high biological value
- Consume a varied diet, that includes whole grains, dark, leafy green and colorful vegetables, low-fat or skim dairy products, nuts, lean meat and poultry, and fish with high omega-3 content
- Stop smoking if you smoke
- Maintain a healthy body weight
- If you drink alcohol, drink in moderation

**Summary**

The Baby Boomer generation shares commonalities among themselves, like others before and those to follow. Most certainly, entire generations cannot be stereotyped. However, this short review was meant to pique your interest in some of the areas that should be considered when working with this population. Though sarcopenia may be more rapid in this age group, it is imperative that assumptions are not made simply due to age. Fitness and dietary evaluations, as well as overall health evaluations (e.g., kidney function) and personal goals are required, and will provide the needed information to arrange the best fitness and nutrition plan.

**About the Author**

Stella Lucia Volpe, Ph.D., R.D., LDN, FACSM, is an associate professor and the Miriam S. Term Endowed Chair in Nutrition in the Division of Biobehavioral and Health Sciences at the University of Pennsylvania, Philadelphia, PA. She is a member of the Gatorade Sports Science Institute Network. Her degrees are in both Nutrition and Exercise Physiology, and she also is ACSM Certified Clinical Exercise Specialist® certified. Dr. Volpe’s research focuses on obesity and diabetes prevention, using traditional interventions, mineral supplementation, and more recently, by altering the environment, to result in greater physical activity and healthy eating. Dr. Volpe is an associate editor of ACSM’s Health & Fitness Journal®.

**Helpful Web sites**

American Dietetic Association: http://www.eatright.org/cps/rde/xchg/ada/hs.xsl/index.html

United States Department of Agriculture: http://www.mypyramid.gov/

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**References**


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**Popular Supplements.. Continued from Page 8**

need not look further than their local grocery store. Eating a varied, well balanced diet that meets energy, protein, and micronutrient requirements is sufficient to maintain health. When micronutrient requirements are not met with food, a multivitamin can make up for what may be lacking in the diet.

**About the Author**

Julie Barrett, R.D., is a registered dietician and has been working in Clinical Nutrition for the past year at Scripps Memorial Hospital with a trade variety of patients. She graduated from California Polytechnic Institute, San Luis Obispo and did her internship at Yale-New Haven Hospital in New Haven, Connecticut. She is completing her Masters of Science in Nutrition at San Diego State University. She is interested in health & wellness, lifestyle coaching, and sports nutrition. She has recently relocated to San Francisco and is currently working for California Pacific Medical Center.

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Self-Test #1 (2 CECs)
Carb-restricted diets and resistance training:

1. Which of the following is associated with adiposity?
   a. Decrease in bone mineral density
   b. Poor insulin sensitivity
   c. Hypertension
   d. Low inflammation
   e. High HDL-C

2. Which of the following is NOT a typical result of a CRD?
   a. Greater weight loss than a LFD
   b. Improved insulin sensitivity
   c. Reduced blood triglycerides
   d. Reduced HDL-C
   e. Greater fat loss than a LFD

3. Which is a common negative result of body weight reduction?
   a. Loss of LBM
   b. Decrease in waist circumference
   c. Loss of FM
   d. Increased LDL-C
   e. Increased blood pressure

4. Which tactic has the most potential to preserve lean body mass (LBM) during weight loss?
   a. Increased carbohydrate intake
   b. Increased protein intake
   c. Resistance training
   d. a and c
   e. b and c

5. Based on this article, which treatment was best able to decrease percent body fat?
   a. LFD
   b. CRD
   c. LFD + exercise
   d. CRD + exercise

Self-Test #2 (1 CEC)
Nutrition Supplements:

1. Caffeine is only effective as an ergogenic aid in high doses. TRUE FALSE

2. Creatine is naturally occurring in
   a. Beef
   b. Pork
   c. Tuna
   d. None of the above
   e. All of the above

3. Glutamine is
   a. A fuel for immune cells
   b. A glucogenic amino acid
   c. A good source of energy
   d. a & b
   e. all of the above

4. Glucosamine is an effective treatment for osteoarthritis. TRUE FALSE

5. Quercetin supplementation
   a. May promote glycolysis
   b. May effect mitochondrial energy metabolism
   c. May reduce oxidative stress
   d. None of the above
   e. All of the above

Self-Test #3 (1 CEC)
Nutrition and PA for Baby Boomers:

1. The majority of the people surveyed on their nutrition behaviors in the American Dietetic Association: Nutrition and You: Trends 2000 stated that they were:
   a. “I’m already doing it”
   b. “I know I should, but…”
   c. “Don’t bother me”
   d. None of the above

2. In simple terms, “sarcopenia” refers to:
   a. Low protein in the blood.
   b. Low protein intake.
   c. Increased muscle mass.
   d. Decline in muscle mass.

3. Sarcopenia begins around what age, and at what percent decline per year?
   a. 40 years, 0.5% to 1.0%
   b. 40 years, 1.0% to 1.5%
   c. 50 years, 0.5% to 1.0%
   d. 50 years, 1.0% to 1.5%

4. The combination of ________ and ________ can help to decrease the rate of progression of sarcopenia.
   a. Physical activity and stress
   b. Physical activity and weight loss
   c. Physical activity and weight gain
   d. Physical activity and nutritional intake

5. It is important that gender, race, ethnic and similar variables are taken into account for each client. TRUE FALSE
ents around the workouts, subjects consumed a low-carb/high-protein supplement before and after each session.

After 12 weeks, weight loss was nearly two-fold greater in subjects following the CRD (-10.1 kg) than the LFD (-5.5 kg), and both diet-only groups experienced significant losses in FM and LBM measured via the Lunar Prodigy DXA (Figure 2). Resistance training reduced the magnitude of weight loss, but this was due to the fact that they were actually able to increase LBM (rather than simply preserve it) without compromising FM loss in both diet groups. The most dramatic reduction in percent body fat was in CRD + RT (-5.3%), followed by LFD + RT (-3.5%), CRD (-3.4%), and LFD (-2.0%). Previous studies focused on suppressing the loss of LBM, where this trial opened a door to new possibilities – actually gaining muscle mass while losing weight and FM.

When the Layman and Volek studies are compared (Figure 2) a similar pattern and magnitude of change in body weight are seen across the four groups. The CRD outperformed the LFD in both studies. In addition, both investigations demonstrated that the addition of RT results in beneficial changes in LBM. Dietary protein intake was very similar between the CRD groups in each study and therefore does not seem to be the contributing factor for the directional differences in LBM changes. On the other hand, the Layman intervention may have promoted greater fat loss in the exercising subjects due to the inclusion of endurance exercise.

CONCLUSIONS

Obesity, metabolic syndrome, and diabetes have reached epidemic proportions and there is no ‘one’ pharmacologic treatment that targets fat loss and all of the metabolic markers. Experimental results demonstrate that carbohydrate restriction offers a viable alternative to fat restricted diets that have had only limited success. Carbohydrate restricted diets have repeatedly resulted in favorable body weight, lipid, and insulin sensitivity improvements, and this recent evidence demonstrates that a CRD is also an effective method to favorably impact body composition. A primary concern with conventional weight loss approaches is the loss of LBM that occurs when FM is decreased. Consuming higher protein, while restricting carbohydrate, allows for greater preservation of LBM. Finally, if a CRD is paired with periodized RT, fat loss and increases in LBM can occur simultaneously while still promoting robust improvements in metabolic health.

About the Author

Erin Quann is a Registered Dietitian at the University of Connecticut. She has a Master’s degree in Exercise Science and is currently earning her Doctorate degree in the Department of Kinesiology. She actively participates in several research investigations to determine the optimal nutrition and exercise prescription for overall health and performance. Erin also gets involved in the community by giving nutrition education presentations and offering individualized dietary counseling. She is actively involved in ACSM, ADA, and ASN and is the Student Representative for the New England chapter of ACSM.

REFERENCES

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