CONNECTICUT INTERSCHOLASTIC ATHLETIC CONFERENCE

CIAC COACHES UPDATE

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HAPPY HOLIDAYS

FROM YOUR CIAC

The December issue of " Updates" is about fueling the body during the sport season. This is an area that is vital to an athlete's overall health as well as his/her performance, and it is an area that is often not addressed by coaches. There is a wealth of information on essential food and drink for adolescent athletes that is available online as well as in the multitude of sports performance books that can be found in local bookstores.

Coaching courses offered at the CIAC during January are listed.

Finally, congratulations to all the teams and coaches that qualified for the CIAC fall tournaments. Although there was a sense of triumph and fulfillment to those teams that won their respective tournaments, there is also the invariable disappointment to all of the teams and coaches that did not see the season end as they had wished. However, there should be a sense of satisfaction to all of the participants for having completed a successful season.

We are interested in your thoughts on our "Updates" publications. We are interested in knowing if the articles are beneficial to your coaching efforts, and we would also like to know topics you would like to see addressed in future issues. Send your thoughts to Bob Lehr at rlehr@casciac.org

Best wishes for a wonderful holiday season and a satisfying New Year!

INSIDE THIS ISSUE:

NEVER GET HUNGRY, NEVER GET THIRSTY:

A Drug-Free Nutritional Strategy for Optimizing Athletic Performance

by Dan Benardot, Ph.D., DHC, RD, FACSM

About the Author:

Dan Benardot is Associate Professor of Nutrition and Associate Professor of Kinesiology and Health at Georgia State University. He is author of "Nutrition for Serious Athletes" ©2000, Human Kinetics, co-author of the "ACSM Fitness Book, 3rd Edition" ©2004, Human Kinetics, and Editor-in-Chief of "Sports Nutrition: A Guide for Professionals Working with Active People," 2nd Edition ©1994, the American Dietetic Association. He is currently working on "Advanced Sports Nutrition," to be published by Human Kinetics in 2005. He was a nutritionist for the Gold-medal winning Gymnastics Team at the 1996 Atlanta Olympic Games and the medal winning marathoners at the 2004 Athens Olympic Games.

INTRODUCTION

Exercise has two effects on nutrient requirements.

It results in an increase in the rate of energy usage and, because of the greater heat production associated with higher levels of energy metabolism, an increase in the rate of water lost as sweat. It should be widely understood that athletes need to increase energy substrate and fluid consumption to meet this additional nutritional burden, yet nutritional surveys suggest that athletes don't eat enough and don't drink enough.[1,2,3] Moreover, it appears that energy consumption is not well timed, which negatively impacts both body composition and performance.[4,5,6]

The outcome of this widespread athletic malnutrition is all too well understood: An excessive reliance on supplements and ergogenic aids to overcome the deficits created by inadequate energy and fluid consumption. It is likely that athletes who pay attention to food and drink intake will do more to achieve at their conditioned capacity than any other action they can take. Focusing on food and drink is a less expensive, more dependable, and a safer strategy for improving athletic performance than relying on supplements and ergogenic aids, which may have indefinite content and unpredictable quality.

ENERGY INTAKE

Much of the discussion on energy intake focuses on the optimal distribution of the energy substrates: carbohydrate, protein, and fat. (Although there is no question that focusing on a diet high in complex carbohydrates, moderate in protein, and relatively low in fat is performance enhancing.) But this discussion has little meaning in the face of energy intake inadequacy. Put simply, it doesn't matter if you put high-octane fuel in the system if there isn't enough fuel to get you where you want to go. Weight and lean mass stability are the best indicator that energy intake matches need. A failure to consume sufficient energy leads to either a reduction in weight or a reduction in lean mass (or both), as the body tries to compensate for this deficiency. For most athletes, a lower relative lean mass and higher relative fat mass is not desirable and is a physiological marker associated with decreased performance. In what must be considered a terribly wrong reaction to this relatively higher fat mass, athletes commonly reduce energy intake still further to reduce the fat mass. The impact of this constant ratcheting down of energy intake is weight loss with a greater loss of lean mass than fat mass, with fat constituting an ever-higher proportion of body weight.[7,8]

It is possible that this cycle of lowering energy intake to adapt to a constantly rising relative fat mass is predictive of the eating disorders seen too often in athletes where 'appearance' is a factor in a sport's subjective scoring.[9] To emphasize this point, it should be noted that anorexia nervosa victims at death have a terrible loss of weight, a terrible loss of lean mass (the weight of the heart is typically 50% of normal), but a relatively high body fat percent. Severely deficient caloric intakes, therefore, lead to a greater cachexia of lean mass than fat mass.[10] The concept that a significant reduction in calories (i.e., 'dieting') results in an improved body profile and body composition simply does not stand up to scrutiny. While a short-term subtle lowering of body weight may be temporarily associated with an enhanced performance, the long-term effects of such low-calorie 'diets' is to lower the intake of needed nutrients (a problem that can manifest itself in disease frequency and increased risk for low bone density) and to regain the weight, which is made up of less lean and more fat. To make matters worse, the lowering of lean mass makes eating normally without weight gain more difficult.

A micro-economic view of the energy balance issue may shed some light on how athletes should eat to achieve an optimal body composition that enhances performance. A study of 4 groups of national-level female athletes (rhythmic gymnasts, artistic gymnasts, middle-distance runners, and long-distance runners) found that those who deviated most widely from perfect energy balance *during the day* had the highest body fat levels, regardless of whether the energy deviations represented surpluses or deficits.[11] This strongly suggests that the common eating pattern for athletes, which is typified by infrequent meals with a heavy emphasis on a large end-of-day meal, is not useful for meeting athletic goals because it is guaranteed to create large energy deficits during the day. While this energy deficit may be made up for at the end of the day to put an athlete in an 'energy balanced' state, this type of eating pattern is typified by weight stability but higher than desirable body fat levels.

Understanding that blood sugar fluxes every three hours (after a meal, it rises, levels off, and drops in three hours), the reason for the higher body fat level becomes clear. With delayed eating, blood sugar drops and the amino acid alanine is recruited from muscle tissue to be converted to glucose by the liver. While this stabilizes blood sugar, it does so at the cost of the muscle mass. In addition, both low blood sugar and large meals are associated with hyperinsulinemia, which encourages the manufacture of fat. So, delayed eating followed by an excessively large meal, which is typical of the athletic eating paradigm, is an ideal way to lower muscle mass and increase fat mass… not what athletes want to do. A number of studies that have assessed eating frequency have come to the same conclusion: the more frequent the eating pattern, the lower the body fat and the higher the muscle mass.[12,13,14,15] Frequent eating reduces the size of within-day energy deficits and surpluses, and helps to stabilize blood sugar.

Athletes concerned about weight have, for a long time, learned to cope with the feeling of low blood sugar by consuming a diet product (diet colas are popular). While these diet products do nothing to resolve the very real physiological need for energy to maintain an adequate blood sugar, they do provide a central nervous system stimulant (usually caffeine) that masks the sensation of hunger. However, since the status of the blood sugar is maintained at a low level through this strategy, the outcome will inevitably be less muscle and more fat. It is clear from these studies that the only appropriate strategy of weight loss is a subtle energy deficit that results in only a slight deviation from a within-day energy-balanced state.

What are athletes to do? *Never get hungry*. This is not easy on a typical 3-meal-a-day eating pattern, which provides for a refueling stop every 5 to 6 hours, and it is less easy on typical athlete eating patterns which heavily backload intake. Since blood sugar is known to rise and fall in 3 hour units, it makes sense to have planned snacks. If you're weight stable, the best way to initiate this process so you don't eat too much is to eat a bit less at breakfast, and eat the remainder at mid-morning, and do the same for lunch and dinner. Total caloric intake will remain the same, but the athlete will avoid sharp energy deficits and surpluses during the day. Besides the improved nutrient intake, and better body composition associated with this type of eating pattern, athletes can also expect improved mental acuity and enhanced athletic performance.

FLUID INTAKE

Perhaps the single most important factor associated with sustaining a high level of athletic performance is maintenance of blood volume during exercise. Despite this, studies have demonstrated that, even in the presence of available fluids, athletes experience a degree of voluntary dehydration that lowers blood volume and negatively impacts performance.[16] Given the tremendous amount of heat that must be dissipated during exercise through sweat evaporation, athletes have no reasonable alternative for sustaining exercise performance than to pursue strategies that will sustain the hydration state. Failing this will result in, at a minimum, premature fatigue and may also lead to potentially life-threatening heat stroke.

Temperature regulation represents the balance between heat produced or received (heat-in), and heat removed (heat-out). When the body's temperature regulation system is working correctly, *heat-in* and *heat-out* are in perfect balance and body temperature is maintained.[17] The two primary systems for dissipating or losing heat while at rest are to move more blood to the skin to allow heat dissipation

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through radiation and to increase the rate of sweat production. These two systems account for about 85% of the heat lost when a person is at rest, but during exercise virtually *all* heat loss occurs from the evaporation of sweat.

Working muscles demand more blood flow to deliver nutrients and to remove the metabolic by-products of burned fuel, but at the very same time there is a need to shift blood away from the muscles and toward the skin to increase the sweat rate. With low blood volume, one or both of these systems fail, with a resultant decrease in athletic performance.

Heavy exercise can produce heat that is 20 times higher than the heat produced at rest. Without an efficient means to remove this excess heat, body temperature will rise quickly. (The upper limit for human survival is about 110° F, or only 11.5° F higher than normal body temperature.) With the potential for body temperature to rise at the rate of about 1°F every 5 minutes, it is conceivable that underhydrated athletes could be at heat stroke risk only 55 minutes after the initiation of exercise.[18]

Athletes working hard for 30 minutes would create 450 kcal of excess heat that would need to be dissipated to maintain body temperature. Since 1 ml of sweat can dissipate approximately 0.5 calories, athletes would lose about 900 ml (almost 1 liter) of sweat. In one hour of high intensity activity, approximately 1.8 liters of water would be lost. On sunny and hot days when the heat of the sun is *added* to the heat produced from muscular work, athletes would need to produce even more sweat to remove more heat. Sweat doesn't evaporate off the skin as easily when it is humid, so still more sweat must be produced in hot and humid weather. Well-trained athletes exercising in a hot and humid environment may lose over 3 liters of fluid per hour. [19]

No level of *low* body water is acceptable for achieving optimal athletic performance and endurance, so athletes should have a strategy for *maintaining* optimal body water during exercise. The problem is that athletes often rely on *thirst* as the marker of when to drink. Since the thirst sensation only occurs *after* a loss of 1 to 2 liters of body water, relying on thirst is an inappropriate indicator of when to drink.[20]

Instead, the athlete should strategize on how to *never get thirsty*. Ideally, this strategy should involve helping athletes determine how much fluid is lost during typical bouts of physical activity, and developing a fixed fluid consumption schedule from that information (typically 3 to 8 ounces every 10 to 15 minutes of a sodium-containing 6–7% carbohydrate solution.)

SUMMARY

Both hunger and thirst are emergency sensations marking the onset of performance-reducing problems. As such, they should be avoided through a planned eating and drinking timetable that is integral to the athletes' training schedule and lifestyle. Perhaps no other two factors have the potential for making such an enormous positive impact on health and performance. Put simply, athletes interested in performing up to their conditioned abilities and skill levels should *never get hungry* and *never get thirsty*.

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Module 5 - CIAC Rules & Regulations

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Module 2 - Communication, Public Relations & Organization

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