Nutrition for Soccer Players

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Introduction

The essence of sport is the element of uncertainty. Every fan wants to see his or her team win, yet sport would fade away if the outcome were not in doubt. Many factors contribute to success in sport, and nutrition plays only a small part relative to the influence of genetic endowment, training, motivation, and other factors. Where everything else is equal, however, nutrition can make the vital difference between winning and losing. This is easily demonstrated in field and laboratory settings for simple locomotor sports (eg, running, swimming, and cycling). However, in complex team sports such as soccer, it is much more difficult to demonstrate an immediate impact of nutrition on performance.

Not surprisingly, sportsmen and women generally are concerned about their diet, although concern is not always matched by an understanding of basic nutrition principles. This has several consequences and has led to many myths proven hard to dispel. Some of the dietary practices followed by athletes in pursuit of success are sound, but others have no beneficial effect and may even be harmful. Nonetheless, such practices are often encouraged by those who stand to gain financially from sales of special diets, sports foods, or dietary supplements.

As our understanding of the molecular and cellular basis of sports nutrition grows, so too does our understanding of some of the eating strategies that sportsmen and women can apply to enhance the prospect of success in their chosen sport. There is a growing realization that nutrition may have a far greater role in supporting consistent intensive training than as acute intervention on the day of a match.

Soccer is played by men and women, and by children, adolescents, and adults alike. All can benefit from good eating strategies based on sound nutrition goals. The diet that promotes best performance is entirely consistent with current guidelines for healthy eating.

Nutrition for Training and Match Play

Contact sports can embrace many different codes (eg, soccer, American football, rugby, Australian rules), but even within the same team, players may have very different physiques and physiological characteristics. The training aim for the soccer player is to build on existing strengths and develop areas of weakness. There may be a need for change in body mass and composition, usually involving increased muscle mass and, sometimes, reduced fat mass. Strength, power, and stamina must all be developed simultaneously so that one does not compromise the other, and the training program must also accommodate work on skills and tactics. The player must be careful to avoid illness and injury that will interrupt training or prevent availability for team selection.

It has long been known that advantages exist in ensuring high carbohydrate intake after each training session to maximize the speed of recovery of the muscle glycogen stores and, thus, allow more frequent training sessions with better quality training and less cortisol-mediated suppression of immune function. Therefore, players were once encouraged to eat high-carbohydrate snacks immediately after training. We now know, however, that this may be helpful when there are only a few hours between training sessions—as in preseason "two-a-day" training sessions—but that relatively normal eating patterns will suffice when longer periods (about 24 hours) are available for recovery.

A key development in recent years is the recognition that the amount of protein in a player's diet may be of less importance than the total energy intake, the availability of carbohydrate, and the timing of nutrient intake. The traditional approach was to ensure a high protein intake, but there is compelling evidence that intakes in excess of about 1.7 g/kg/d will not help build and repair muscles. There is also good evidence that intake of small amounts (perhaps 10–20 g) of protein just before, during, or after a training session will promote net positive protein balance in trained muscles. Evidence is slowly emerging that this can translate into improvements in functional capacity of the muscles. The attraction of this nutritional strategy is that it offers the prospect of the same training outcome with less training. If this can be achieved, it frees time and effort for working on skills and tactics and reduces the risk of training-ground injuries. This might be called *training smarter*, rather than just training harder.

A high-carbohydrate diet may be especially important when games are played with limited recovery time between

them. Beginning play with low muscle and liver glycogen stores is likely to lead to early fatigue with an impairment of sprinting ability, especially late in the game. This is the time when most goals are scored, and fatigue is undoubtedly a factor.

Hydration

Hydration is another area of soccer in which improving one's understanding of nutrition principles is still necessary. While the days of eating an orange or drinking a cup of tea at half-time have been replaced by a more professional approach to appropriate use of water and sports drinks, some key issues remain. Players are often hyperthermic at the end of games, and sweat losses can reach or even exceed 3 to 4 L. Heat-related deaths are fortunately very rare, but muscle cramps and other hydration-related decrements in performance are rather common.

Based on assessment of urinary parameters, a significant proportion of soccer players begin training and match play already dehydrated. These players might be advised to increase fluid intake in the hours before training or playing. Most players will take advantage of opportunities to consume water or sports drinks during breaks in play and at intervals, but fluid intake seldom matches loss; therefore, most finish training and match play with a fluid deficit. Fluid deficit may reach 3% to 5% in some players, at which point it is likely to affect physiological and thermoregulatory function, and possibly also some aspects of cognitive function. It is not necessary to replace all fluid losses, but as a general rule, players should aim to drink enough to limit net fluid loss to no more than about 2% of body mass.

Sodium losses in sweat may be high in some players and may be a precipitating factor in some cases of muscle cramps. Both sweat rate and sweat salt concentration vary greatly among individuals, and sweat salt losses may be less than 1 g or more than 10 g in training or match play. Those with high sweat salt losses seem to be more prone to muscle cramps and may benefit from drinks with higher sodium content than that of most commercial sports drinks (typically about 20–25 mmol/L).

Dietary Supplements

A wide range of supplements is available to athletes, often with exaggerated claims of efficacy. Many are not supported by evidence of their effect on performance or their safety when taken in high doses for prolonged periods. Sports supplements that may be useful in helping the athlete meet nutritional goals during training and competition include sports drinks, high-carbohydrate supplements, and liquid meal supplements. These are more expensive than everyday foods, but often provide a convenient and practical way of meeting dietary needs in a specific situation.

In general, supplementation with vitamins and minerals is not warranted if a varied diet is eaten in amounts sufficient to meet energy needs. If there is a clinical need (eg, as in established iron deficiency), supplementation should be clinically supervised and monitored. A broad-spectrum, low-dose multivitamin and multimineral supplement may be helpful when food intake is restricted.

There is good evidence of an ergogenic effect of a few supplements, including caffeine, creatine, and muscle-buffering agents. The use of caffeine in high doses in competition was once likely to result in a positive doping test, but this restriction was removed in January 2004. Caffeine in small doses (typically 2–4 mg/kg) can improve performance in a variety of exercise tasks, including some designed to simulate demands of soccer, probably by actions on adenosine receptors in the central nervous system. Creatine, in the form of creatine phosphate, acts as an energy source for adenosine triphosphate resynthesis in high-intensity exercise. Ingestion of about 10 to 20 g for 4 to 6 days can increase muscle creatine content by 10% to 20%, leading to gains in lean body mass and improvements in strength and sprint performance. The biggest improvements in performance are generally seen in repeated sprints with limited recovery, but there is limited evidence for efficacy during competitive soccer. Acute ingestion of large doses of sodium bicarbonate (about 0.3 g/kg) can increase extracellular buffering capacity and improve performance in exercise lasting from about 30 seconds to about 10 minutes. Supplementation with β-alanine or carnosine may increase intracellular buffering capacity and can enhance performance of high-intensity efforts.

A concern with many supplements on the market—apart from the lack of evidence of efficacy and safety—is the recent spate of reports of their contamination with prohibited substances, including stimulants and anabolic steroids. The amounts present are generally too small to be effective in improving performance but can cause a positive drug test.

Conclusions

Good food and fluid choices can support the performance of soccer players, primarily by supporting consistent training and maximizing the adaptations to the training stimulus. Food and fluids consumed before and during games can also affect the player's ability to make best use of his or her soccer skills.

Recommended Reading

1. Maughan RJ, ed: *Nutrition and Football*. London: Routledge; 2006.
2. Shirreffs SM, Aragon-Vargas LF, Chamorro M, et al.: **The sweating response of elite professional soccer players to training in the heat.** *Int J Sports Med* 2005, **26:**90–95.