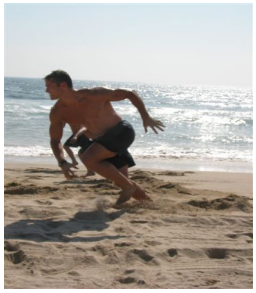
Nutritional Strategies for Enhancing Sports Performance



Bookstores across America are filled with a wide array of popular diet books which proclaim tasty cuisine with fat burning and muscle preserving qualities. Each dietary approach may have its own merits, but oftentimes they fall short of addressing the needs of athletes. Athletes have specialized needs which include sustained energy release during competition, aggressive fluid and electrolyte replenishment, increased intake of supplements including antioxidants and amino acids, and post-workout strategies for maximizing tissue repair and recovery.

In order to address the particular needs of athletes, exercise physiologists and human performance experts are advancing beyond the study of how macronutrients deliver performance gains. Expanding research is directed at how to formulate macronutrient strategies according to the energy systems of the athletes. The goals of these strategies are to promote protein synthesis, enhance recovery, and prepare the athlete for future high intensity training bouts.

Athletic events can commonly be classified according to the primary energy system called upon by the athlete. While most team sports require a combination of the three systems, a general breakdown of each individually follows:

1. **Adenosine Triphosphate Phosphocreatine System (ATP-PC)**, also called anaerobic-alactic training, requires explosive bursts with maximum force muscle contractions lasting 5-10 sec in duration. Examples of this type include Olympic lifting, football, volleyball, hockey, baseball, sprinting events, and weight throwing events.
2. **Lactic Acid System**, also called mixed anaerobic-lactic training, includes near maximal bursts from 25-90 seconds in duration. Examples include downhill skiing, basketball, hockey, football, gymnastics, and short distance events in speed skating and swimming.
3. **Aerobic Energy System** is involved in events requiring endurance, usually 12-60+ minutes in length. Examples include long distance cycling, running, swimming, hiking, etc.

Regardless of which athletic event is chosen, the goals of an athlete's post-workout nutrition regimen are essentially the same. Serious athletes need a nutrition plan which

1. rapidly initiates the process of muscle glycogen regeneration,
2. decreases exercise-induced muscle protein breakdown, and
3. increases muscle protein synthesis.(1)

However, since each athletic event demands different physiologic, metabolic and neuromuscular requirements, special nutritional considerations must be made in the areas of timing, macronutrient volume, supplementation, and speed of nutrient assimilation. The following body of research presents distinct strategies for the three energy systems.

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A. Nutrient Strategies for Athletes using the ATP-PC System:

Athletes engaged in sports that require ballistic muscular contractions with maximal force production have unique amino acid requirements. In a recent study, competitive sprinters and jumpers completed two sets of two testing sessions, interspersed with a five-week training period, while the researchers measured the effects of the activity on a number of blood variables. During the five week macrocycle, the athletes completed a periodized off-season program, and consumed a diet which consisted of 53% carbohydrates, 32% fat, and 15% protein (1.25g protein per kg of body weight).

After the 5 week training session, blood tests revealed that fasting levels of amino acids had dropped 20%, while testosterone levels increased by 25%. This data suggests that power training had robbed the body of its amino acids stores, presumably as the body accounted for exercise-induced musclar damage. The testosterone increases indicate that the body was tending towards a healthy anabolic state, but was amino acid poor. The implication here is that with greater amino acid consumption (1.7g/kg), a higher rate of protein sysnthesis would result.(2)

B. Nutrient Strategies for Athletes using the Lactic Acid System:

Athletes competing in sports which require a mixture of power, high output bursts, and mid-range endrance activities will benefit from higher protein intake, as well as a specialized approach to fluids and antioxidants. A study in the *Journal of Applied Physiology* compared a group of experienced strength-trained athletes with a group of sedentary controls. Both groups were tested at three protein intake levels - low, moderate and high (0.86, 1.4 and 2.4 g/kg body weight respectively). The results indicated that the protein intake required to maintain body protein levels was 1.4g/kg for strength athletes and 0.69g/kg for sedentary subjects. Increasing protein intake from low to moderate enhanced the rate of protein synthesis in strength athletes, but increasing to the high level did not yield further benefits.(3)

In addition to the increased protein strategy, lactic acid system athletes can benefit from adding antioxidants such as Vitamin C (500mg) and Vitamin E (400IU) during the post workout phase (<1 hour post workout). During the acute post workout phase, these antioxidants help to diminish free-radical induced cellular damage. Fluid and electrolyte replenishment, including upwards of 2L of water in the first hour of the post-workout phase is also prescribed by many exercise physiologists.

C. Nutrient Strategies for Athletes using the Aerobic Energy System:

Recent studies have demonstrated the importance of both glycogen and amino acid replenishment for enhancing recovery with endurance athletes. Scientists in Maastritch University in the Netherlands examined the effects of (a) carbohydrates-only drink (1.2 g/kg per hour of 60:40% maltodextrin/glucose) and the carbohydrates drink plus (b) zero, (c) 0.2, or (d) 0.4 g/kg per hour of a protein hydrolysate and amino acid mixture on insulin responses.

Eight male cyclists ingested these beverages every 30 minutes for 3 hours after a long bike ride. Only the beverages containing the carbohydrates and protein produced significant insulin responses (+52% and +107% for the 0.2 and 0.4 g/kg per hour drinks, respectively).(4)

Elevated insulin concentrations enhance glycogen synthase activity, which in turn promotes glycogen synthesis. The addition of protein hydrolysate and amino acids doubled glycogen synthesis rates even more, a vital process for the endurance athlete.

About the Author:

Eric Minkwitz graduated from Williams College in Williamstown, MA in 1996, with a double major in Biology and Environmental Studies, and is a Certified Fitness Trainer with the International Sports Sciences Association. While playing professional football in Hamburg, Germany, Mr. Minkwitz trained with renowned German Olympic speed and strength coach Horst Meinhardt, and also provided sports training services for the junior level football team.

For the last eight years, Eric has headed *MINK TRAINING SYSTEMS*, a sports performance group in Redondo Beach, CA that specializes in power training, movement assessments, nutritional consultations, and speed improvement. He is also an experienced Physical Therapy aide at Sports Medicine Institute – LA.

Mr. Minkwitz also has four years of experience in medical writing, clinical trials research, and strategy consulting servicing the biotech and pharmaceutical industries. He is the author of *"US Nutritional Supplement Market: Key Players and Trends"* and *"Changing Attitudes Towards the Low Fat Diet",* as well as a contributor in other reports in acute neurology, vascular disease, and obesity. He currently writes articles on sports nutrition and training strategies for competitive athletes for a variety of sources.

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