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Nutritional Considerations for the Adolescent Athlete

Athletic performance during adolescence has received a great deal of attention in recent years as competitive performance has increased in both intensity and popularity. Adolescence (i.e., 13 – 19 years of age) marks the beginning of increased energy demands, hormonal changes, transition into puberty and elevated rates of growth and development. A wide range of physiological variation exists within this age range; therefore, individual recommendations for carbohydrates, protein, fat and fluids should take into account both physical maturation age and activity level (3,7).

Calorie Requirements

Adolescent athletes experience an increased demand for calories to ensure proper growth and physical development as well as those demands required for training. Adolescents who do not consume enough calories to meet those demands may experience a loss of muscle mass, menstrual dysfunction, loss or failure to gain bone density and an increased risk for fatigue, injury or illness (3). Due to the number of factors affecting adolescent energy needs, the Institute of Medicine (IOM) recommends a range of caloric recommendations (as seen in Table 1). Adolescent athletes should consume the higher end of the calorie range seen in Table 1 and those that experience a period of rapid growth, or a “growth spurt,” should consume an additional 500 calories per day above their usual intake (2).

Macronutrient Requirements

To determine macronutrient (i.e., carbohydrates, protein and fat) needs for adolescent athletes, the total daily number of calories is broken down below.

Carbohydrates are the main source of energy during exercise and serve to replenish muscle and liver glycogen after bouts of intense physical exercise. Adolescents should aim to consume 55 – 60% of their daily calorie intake as carbohydrates (2). Athletes training in endurance exercise for longer than 90 min are recommended to consume 6 – 10

Table 1: Institute of Medicine (IOM) Calorie Recommendations for Adolescent Athletes (3).

Adolescents: 13 – 19 Years	
Boys	3000 – 6000 calories per day
Girls	2200 – 4000 calories per day

g of carbohydrates per kg of body weight during training. Additionally, those who train aerobically for longer than 60 min should consume 25 – 30 g of carbohydrates every 30 min during exercise (4). Refueling after a bout of intense exercise is critical to replenishing glycogen stores and keeping energy up. Guidelines recommend a 3:1 ratio of carbohydrates to protein for post-exercise consumption (e.g., crackers and cheese, cereal and milk or fruit and yogurt) (7).

Protein provides essential amino acids that support the growth and development of lean body mass and contribute to athletic performance during periods of extended exercise and recovery (4,6). The recommended daily allowance for protein in active adolescents is 2 g/kg of body weight per day (g/kg/day) (4). Activity level and type of training require varied protein needs for adolescent athletes (as seen in Table 2) (4,7). Eating more protein than the daily requirements should be avoided because it can lead to dehydration and loss of calcium, and has not been proven to improve performance (4).

Table 2: Adolescent Athlete Daily Protein Recommendations (3).

Activity Level	Protein (g/kg/day)
Early Resistance and Endurance Training	1.5 – 1.7
Resistance Training	1.2 – 3.4
Maintenance Phase	1.0 – 1.4

Table 3. IOM Fluid Recommendations (4).

Sex	Age	Liters/day
Male	9 – 13 years	2.4 L/day
	14 – 18 years	3.3 L/day
Female	9 – 13 years	2.1 L/day
	14 – 18 years	2.3 L/day

Fats are a secondary fuel source during prolonged exercise and are necessary for normal growth and function. Fat is also an essential component for the female reproductive cycle, vitamin absorption and protection of internal organs (3). There are no additional recommendations for type of fat or intake above those of a normal individual. Daily fat intake should constitute 20 – 25% of total daily calories with an emphasis on consuming a total fat intake of no more than 10% saturated fat, 10% polyunsaturated or 10% monounsaturated fats to compose no more than 30% of total calories from fat (2,5,4,7).

Fluid Requirements

An athlete should drink fluids before, during and after athletic events to prevent dehydration and fatigue, and promote optimal performance during exercise (Table 3). Athletes can experience significant water losses through sweat as individual sweat rates vary based on body size, exercise intensity, temperature and humidity (7).

Body weight changes are the best method to determine fluid replacement needs and even a 1% decrease in body weight from sweating can significantly impact athletic performance (6). To account for water losses during an exercise session, athletes should consume 500 mL of fluid for every 1 lb lost during an exercise session (4). In addition, athletes should aim to drink 400 – 600 mL of fluid 2 – 3 hr before exercise and 150 – 350 mL every 15 – 20 min during exercise (4,7). Water is the best source of hydration for exercise that lasts less than 60 min. Athletes exercising longer than 60 min, or at an elevated temperature or humidity level, may benefit from consuming a sports drink with a 4 – 8% carbohydrate solution (4,7,8).

Bottom Line

Adolescence marks a time of increased growth and development that should be accounted for with individualized additional energy recommendations, especially for adolescent athletes. This age group should be monitored closely to ensure they meet energy and hydration needs for proper growth and development as well as for optimal sports performance and overall health. ■

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