

## NUTRIENTS AND TIMING FOR THE PERFECT ATHLETE'S SNACK

By Andrea Q. Vintro, MS, RD, CSSD, LD, owner of Nutrition Logic, LLD in Portland, OR.

Although science weakly (at best) supports snacking for health in the general population, regular snacking by collegiate athletes can improve performance in both sports and academics.

### The Importance of Snacking for Athletes

Collegiate athletes have higher energy needs than nonathletic peers, making it harder to consume their required daily calories through only three meals. This places importance on snacks as a strategy for obtaining additional nutritious foods. Moreover, demanding schedules of classes and sports make it unlikely to have three sit-down meals each day, so planned snacks may be even more important to ensure optimal nourishment.

Research has demonstrated performance benefits when athletes ingest nutrients and fluid at specific times surrounding activity<sup>1</sup> in addition to consuming main meals. Pre- and post-exercise nutrient delivery has been associated with maximizing performance and positively affecting the adaptive response to exercise by maintaining blood glucose levels during exercise and improving recovery.<sup>2</sup> The inclusion of several light snacks daily may be recommended to provide significant amounts of carbohydrate (the primary fuel for highly active cells) and avoid gastrointestinal (GI) complaints that can occur after large meals.<sup>2,3</sup> Some research also reveals better improvements in strength and body composition with frequent protein (and also carbohydrate) dosing throughout the day compared with few doses or a single larger dose.<sup>4</sup>

### Defining and Timing Healthy Snacks

“Snack” has no clinical definition, but it is commonly known as smaller amounts of food eaten between larger meals. Heavy marketing by food manufacturers has influenced the public’s perception that snack foods are highly processed and come in packages, but in reality, snacks can consist of healthy, whole foods. Snacking on healthy, whole foods such as fruit and vegetables has been shown to have a positive impact on weight, whereas persons who snack on processed foods between meals have an increased risk for obesity.<sup>5,6</sup> Snacks can be packaged for convenience, but most snacks should consist of the same foods recommended for an athlete’s daily diet: whole foods including fruits, whole grains, vegetables, lean protein, and healthy fats.<sup>7</sup> To ensure nutrient variety, most snacks should be mixed (i.e., contain more than one food group represented), with the exception of snacks consumed very close to exercise.

Recommendations for amounts and proportions of specific nutrients (specifically carbohydrates and proteins) around activity depend on timing and intensity of the activity, body composition goals, and individual tolerance. Strategic ingestion of natural foods high in compounds such as dietary nitrates (e.g., beet juice) and polyphenols (e.g., cherry juice) also show positive performance benefits.<sup>8,9</sup>

Most collegiate athletes need at least two snacks daily in addition to three larger meals. More snacks are justified depending on body composition goals (e.g., more snacks for muscle gain) and timing of training or competition. For example, additional snacks make sense after late evening training sessions or between daily double intense training sessions. During all-day volleyball tournaments, for example, with only 1 to 2 hours between games, replacing larger meals with multiple snacks makes it easier for athletes to nourish themselves adequately, lowering the risk of stomach upset. The bottom line is that the required number of daily snacks is highly variable, based on the individual athlete’s schedules, training, and personal needs.

## Snacking Situations

### **Snacks Removed from Training or Competition Time:**

General snacks removed from activity should have a mixed nutrient profile, containing at least two food groups: a food high in protein, and at least one complementary whole food from another food group (vegetable, fruit, whole grain, or healthy fat). Except as a “Plan B” option, this is *not* the time to rely on highly processed sport foods (shakes and bars); these products are formulated for use around activity, tend to be calorie-dense, and are overused by both athletes and the general population. Nutrient-dense, high-fiber foods such as vegetables and whole grains are best choices at this time.

Examples of snacks farthest away from training or competition:

- Hummus, carrots, whole grain pretzels
- Peanut butter on celery, apple
- Beans and cheese wrapped in a corn tortilla, red pepper, salsa, and guacamole
- Half turkey and avocado sandwich on whole grain bread, broccoli spears
- Whole grain muffin with nuts and dried fruit
- Tuna with tomato slices, whole grain pita

**Before exercise.** Snacking before exercise helps maximize glycogen stores and maintain glucose levels so the body is prepared for, and can adapt to, training; it also minimizes exercise-associated muscle damage.<sup>3,7</sup> As the time of the snack gets closer to exercise, it should become smaller and contain less protein and much less fat and fiber. A snack too small can lead to hunger during exercise, whereas a meal too large or containing too much fiber or fat can cause GI distress. Snacks should be high in carbohydrate, with high-glycemic foods preferred for some, because they are easier to digest and enter the bloodstream faster, making the fuel more readily available to the exercising cells.<sup>10</sup> For athletes in strength and power sports, small amounts of protein may be included in the pre-exercise snack.<sup>2</sup>

Examples of pre-exercise snacks:

3 – 4 hours before	<ul style="list-style-type: none"><li>▪ Whole grain pancake, poached egg, fruit, nuts, maple syrup; low-fat milk, water</li><li>▪ Pasta with red sauce, chicken, fruit, water</li></ul>
30 – 60 minutes before	<ul style="list-style-type: none"><li>▪ Banana, sports drink</li><li>▪ Dried fruit, crackers or pretzels, water</li></ul>

**During exercise.** For most athletes, it is unnecessary to ingest nutrients other than water during low to moderate-intensity activities lasting 90 minutes. However, in endurance-type or high-intensity sports lasting longer than 60 to 90 minutes, consumption of about 30 to 60 g per hour of carbohydrates (predominantly high-glycemic carbohydrates) has been repeatedly shown to extend endurance performance.<sup>10</sup> Carbohydrate consumption during exercise may also benefit athletes who are not well-nourished at the onset of exercise, or who have not consumed a pre-exercise meal, or who have restricted energy intake for weight loss.<sup>7</sup>

Examples of during-exercise snacks, as tolerated:

- Sports drinks
- Gels
- Blocks
- Bananas
- Crackers

**After exercise (recovery).** Ingesting a combination of protein and carbohydrate within 30 minutes after exercise is important for recovery. The amount depends on duration and intensity of exercise, but for most athletes 15 to 30 g of protein and 2 to 4 times that amount of carbohydrates are recommended.<sup>2,11</sup> Essential amino acids (EAA), including leucine, can increase the rate of muscle protein synthesis. All animal protein (including meat, eggs) are excellent sources of EAA, but liquid sources such as skim milk and sport recovery beverages (with added whey protein) increase protein synthesis rate because of improved digestion and absorption.

The post-exercise snack should be followed by a larger meal with a mixed nutrient profile (from all food groups) within 2 hours; the inclusion of foods high in omega-3 fatty acids and polyphenols (e.g., fatty fish, nuts and seeds, and tart cherries or tart cherry juice) in an athlete's recovery regimen will help reduce muscle damage and pain.<sup>9</sup>

Examples of post-exercise snacks:

- Chocolate milk
- Sport recovery shake
- Greek yogurt with banana
- High protein cereal with milk and fruit
- Egg on English muffin, fruit
- Lean meat or peanut butter sandwich, raisins
- Smoothie made with tart cherry juice, yogurt, banana

**Snacking after dinner or before bed.** There is some concern that night meals cause excess fat gain or disrupt sleep, but research does not support this conclusively. Night meals may be appropriate and even necessary after late night practices, night games/competition, or back-to-back sessions. These meals should be as healthy as any other planned meal. Athletes also need to be aware that sleep deprivation can trigger appetite.<sup>12</sup> To help athletes maintain a healthy weight, it may be prudent to educate them on the difference between appetite caused by fatigue or boredom and appetite caused by physical hunger (indicating the need to refuel for nourishment).

### Snack Mishaps

Athletes should be encouraged to avoid these common snacking mistakes:

- **Skipping a snack because timing or type of food isn't ideal.** Generally, eating something is better than nothing. Athletes should stash extra portable snacks in gym bags, lockers, and cars – and replenish regularly.
- **Eating too large of a snack before exercise.** This often happens if meals earlier in day did not supply enough nutrition, resulting in super-sized appetites before activity.
- **Not planning snacks for the day.** Unplanned meals and snacks often result in less-than-optimal choices, because impulse eating can take over when hunger sets in.
- **Skipping recovery snacks after exercise (thinking it will help with weight loss).** Delaying recovery nutrition not only misses the window for maximum glycogen resynthesis priming the body for the next workout, but also limits muscle growth, reducing total lean body mass.
- **Eating only processed sport foods as snacks.** When only highly processed sport foods replace whole foods at snack time, a great opportunity to consume fiber, vitamins, minerals, and phytochemicals is missed.

### Author

*Written by SCAN/CPSDA Registered Dietitians (RDs). For advice on customizing an eating plan to meet your nutrition goals, consult an RD who specializes in sports, particularly a Board Certified Specialist in Sports Dietetics (CSSD). Find a qualified RD at [www.scandpg.org](http://www.scandpg.org) or [www.sportsrd.org](http://www.sportsrd.org).*

## Reference:

1. Burke L. *Practical Sports Nutrition*. Human Kinetics; 2007. Print
2. Kerksic, C, Harvey T, Stout J, et al. International Society of Sports Nutrition position stand: Nutrient timing. *J Intl Soc Sports Nutr*. 2008;17. Accessed January 5, 2015.
3. Carlsohn A, Nippe S, Heydenreich J, Meyer F. Carbohydrate intake and food sources of junior triathletes during a moderate and an intensive training period. *Int J of Sport Nutr Exerc Metab*. 2012;22:438-443. Print
4. Mamerow MM, Mettler JA, English KL, et al. Dietary protein distribution positively influences 24-h muscle protein synthesis in healthy adults. *J Nutr*. 2014;144::876-880. Print.
5. Phillips S, Bandini LG, Naumova EN, et al. Energy-dense snack food intake in adolescence: longitudinal relationship to weight and fatness obesity research. *Obesity Res*. 2004;12:461-472. Print.
6. McCrory, MA, Fuss PJ, McCallum, et al. Dietary variety within food groups: association with energy intake and body fatness in adult men and women. *Am J Clin Nutr*. 1999;69:440-447. Print.
7. Rodriguez NR, DiMarco NM, Langley S. Position of the American Dietetic Association, Dietitians of Canada, American College of Sports Medicine: Nutrition and Athletic Performance. *J Am Diet Assoc*. 2009;109:509-527. Print
8. Jones AM, Vanhatalo A, Bailey SJ. Influence of dietary nitrate supplementation on exercise tolerance and performance. *Nestle Nutr Inst Workshop Ser*. 2013;75:27-40. Print.
9. Bowtell JL, Sumners DP, Dyer A, Fox P, Mileva KN. Montmorency cherry juice reduces muscle damage caused by intensive strength exercise. *Med Sci Sports Exerc*. 2011;43:1544-1551. Print.
10. Burke LM, Hawley JA, Wong SHS, Jeukendrup AE. "Carbohydrates for training and competition. *J Sports Sci*, 2011;29 (suppl1):S17-S27. Print.
11. van Loon LJC. Role of dietary protein in post-exercise muscle reconditioning. *Nestle Nutr Inst Workshop Ser*. 2013;75:73-83. Print.
12. Spiegel K, Tasali E, Leproult R, van Cauter E. Effects of poor and short sleep on glucose metabolism and obesity risk. *Nature Rev Endocrinol*. 2009;5:253-261, Print

© 2015 National Collegiate Athletic Association  
NCAA is a trademark of the National Collegiate Athletic Association