

Nutrition and Athletic Performance

Daily nutrition recommendations for athletes from the American College of Sports Medicine, American Dietetic Association and Dieticians of Canada

The December 2000 issue of *Medicine & Science in Sports & Exercise* included a comprehensive review of "Nutrition and Athletic Performance. The "joint position paper" is co-authored by the American College of Sports Medicine, the American Dietetic Association, and the Dieticians of Canada.

We've summarized the highlights of the 16-page paper below. In particular, we've converted many of the values to calories/pound, the measurement that is most meaningful to American readers. At the same time, we've retained the grams/kg measurement used by the metric world, and also converted to calories/kg.

DAILY NUTRITION NEEDS

Carbohydrates, Protein, Fats

Carbohydrates: 6 to 10 g/kg body weight, or 24 to 40 calories/kg. American = 2.7 to 4.5 g/pound, or 10.8 to 18 calories/pound.

Protein: For endurance athletes, 1.2 to 1.4 g/kg (4.8 to 5.6 calories/kg). American = .55 to .65 g/pound, or 2.2 to 2.6 calories/pound.

For strength-training athletes, 1.6 to 1.7 g/kg (6.4 to 6.8 calories/kg). American = .7 to .8 g/pound, or 2.9 to 3.1 calories/pound.

Fats: Should not be restricted to less than 15 percent of total calories. An average of 20 to 25 percent calories from fat is okay.

PRE EXERCISE NUTRITION NEEDS

Before a race, long run, or workout 3-4 hours before: Good results have come from 200 to 300 grams of carbo (800 to 1200 calories) in meals 3 to 4 hours before exercise.

1 hour before: Studies have produced mixed results. Early research suggested that taking carbs 1 hour before exercise led to low blood sugar and premature fatigue. However, more recent research shows no effect or a positive effect from a small amount (60 to 200 calories) an hour before exercise.

Morning races: The above carbo strategies are particularly important for morning races, which follow the overnight fast of sleeping.

Glycemic index: Current research has produced mixed results on the question of the glycemic index of pre-exercise meals, and whether or not glycemic index affects performance.

DURING EXERCISE NUTRITION NEEDS

Carbo needs: Research indicates that runners need 30 to 60g of carbo per hour. That's 120 to 240 calories worth.

This "has been shown unequivocally to extend endurance performance."

The carbo should come primarily from glucose. Fructose doesn't work as well. It doesn't matter how you get the carbo--from drinks, gels, or bars. But you must consume the right amount of both carbo and fluids.,(See Fluid Consumption Needs)

And you must take the carbo and fluids from the beginning of the exercise. Don't wait. Protein, fat, and fiber are not necessary during exercise, and may slow the absorption of the carbo.

POST EXERCISE NUTRITION NEEDS

The basic post-exercise formula: Try to consume 1.5 g of carbo per kg of body weight(6 calories per kg) during the first 30 minutes post-exercise. American = .7 grams of carbo per pound, or 2.8 calories per pound. Repeat again every 2 hours for 4 to 6 hours post-exercise.

Timing is important. Getting carbo fast produces the best results."The highest reported rates of post-exercise glycogen resynthesis" occurred in individuals fed every 15 minutes for 4 hours after exercise (they received .4 grams carbo/kg body weight, or 1.6 calories per kg. American = .18 grams/pound, or .72 calories/pound). If you don't eat in the first two hours, the rate of synthesis will be lower. See, Doing The Math, below.

[Note: Fast resynthesis is most important if you intend to do more exercise in the same day or next days. That is, if you're in a heavy training mode. If you're going to take a few days off after a marathon or other hard training, on the other hand, it doesn't matter so much. The body catches up on its own as long as you're consuming enough carbo.]

Again, glucose is more effective than fructose when seeking immediate synthesis. Over 24 hours or longer, this probably makes little difference.

Glucose is the key to glycogen repletion. Adding protein does not improve glycogen storage. However, adding protein might be good "for muscle protein repair and to promote a more anabolic hormonal profile."

FLUID CONSUMPTION NEEDS

Before: Drink 400 to 600 ml (14 to 22 oz) of water or sports drink two hours before.

During: Drink 150 to 350 ml (6 to 12 oz) of sports drink every 15 to 20 minutes. Start drinking shortly after you begin to exercise. Don't wait.

After: Drink at least 16 to 24 oz of every sports drink for every pound of body weight lost.

Metric: Drink 500 to 700 ml of sports drink for every .5 kg of body weight lost.

Note: These amounts are greater than the fluid weight you have lost. Reason: You will urinate away some of it. The principle: You should aim to "overdrink." Select sports drinks that include sodium, or otherwise get some sodium, as with pretzels, chips, salty soup, etc. (See Hyponatremia below.)

Carbo concentration of sports drinks: Sports drinks should be 4 to 8 percent carbo by concentration.

Sodium and sports drinks: Sports drinks with sodium are recommended for exercise more than 1 hour to improve taste and drive to drink.

Sweat rates: Are highly variable. But can exceed 1,800 ml per hour. How much is that in fluid ounces?

Hyponatremia: A handful of marathoners and triathletes have died from hyponatremia, or low blood sodium. This results after long, hot races wherein the athletes have consumed only water, and not sodium-containing sports drinks. Women appear to be more at risk than men. To guard against hyponatremia, drink sodium-containing sports drinks.

DOING THE MATH

Here's the optimal glycogen resynthesis formula for a 150-pound runner. The runner should consume a carbo snack every 15 minutes for 4 hours. That's 16 snacks. Each snack should contain calories equal to $.72 \times 150$ pounds, or 108 calories. When you multiply 108 calories times 16 snacks, you get a total-4-hour carbohydrate intake of 1728 calories.