

Endurance Athlete's Guide to a Nutritional Edge

Proper nutrition is the cornerstone of good health. The right diet will give you abundant energy, maximize your productivity, keep your immune system humming, help you maintain a healthy body weight, minimize your risk of developing chronic diseases such as cancer and heart disease, and add years to your life.

Proper nutrition is also the cornerstone of optimal athletic performance. The right diet will enhance your ability to train hard and compete well, improve your post-exercise recovery, and even reduce your risk of injury and overtraining.

But is the best diet for the health-conscious individual identical to the best diet for the endurance athlete? Not quite. While athletes should generally eat the same way non-athletes do, the rigors of training and competition place some unique demands on your body that require a special approach to fueling. The following four guidelines, along with their accompanying “*Here’s How*” tips, tell you exactly how you should tweak your diet to achieve peak athletic performance.

The Right Mix of Premium Fuels

People are sort of like cars. The more you move, the more fuel you use and the more wear and tear you undergo. And since you, as an endurance athlete, move a lot more than most non-athletes, you need higher-quality fuel for maximum energy and more “dietary maintenance” to reverse the wear and tear your body experiences in training. That means you need a higher percentage of good carbohydrates and high-quality proteins in your diet than your more sedentary friends.

Here’s How—1st Step: Up your carb intake to 60 percent of your daily diet.

Your body gets energy for movement from carbohydrate, fat, and protein, although fat and protein are not used primarily to provide energy. Instead, they are used structurally, with most fat going into cell membranes and most protein going into the muscles. But carbohydrate is used exclusively to provide energy. It is also your muscles’ preferred energy source during intense exercise. So the more you train, the more your dietary carbohydrate needs increase. Most Americans get about 45 percent of their daily calories from carbohydrate, which is perfectly adequate for the non-athlete. But endurance athletes perform better on a diet that’s 60 percent carbohydrate.

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Of course, not all carbs are created equal. The best sources of carbohydrate are natural, unprocessed foods such as fruits, vegetables, and whole grains. These foods contain large amounts of fiber, which slows the processing of carbohydrate so that a greater fraction of it is delivered straight to your muscles and less is converted to fat and stored in your belly. These foods also contain more vitamins, minerals, and antioxidants than other sources of carbohydrates such as refined grains and sweets. This is especially important for athletes, as exercise increases your body's needs for many of these beneficial nutrients too.

Here's How—2nd Step: Up your protein intake to 20 percent of your daily diet.

Of course, an athlete cannot live on carbs alone. Protein is the main structural component of muscles. Many muscle proteins are damaged and broken down when you train. To adequately repair and replace these proteins, you need to consume more protein than non-athletes do. A recent study found that runners' bodies were not able to replace muscle proteins as fast as they were broken down when they ate only the generally recommended amount of protein (1.75 grams per pound of body weight per day). Instead, they required a minimum daily protein intake of 2.65 g/lb/day to maintain a positive "protein balance" (*Metabolism* 06;55(4):501–507).

Getting as much as 20 percent of your daily diet from protein probably won't require any special effort on your part, since the average American's diet already hovers around 18 percent. Just focus on high-quality proteins, such as fish, lean cuts of beef, chicken, eggs, and soy to get the most protein bang for your buck.

Chow Down and Drink Up

Endurance athletes not only need to get a greater percentage of their total calories from carbs and protein, they also need more total calories than non-athletes. That's because total daily caloric needs are determined by how many calories the body burns at rest (which is determined mainly by lean body mass), and how many calories the body burns through activity. Since endurance athletes torch a lot more calories than non-athletes through activity each day, they need to eat more calories. Endurance training also increases your fluid needs, as you lose a lot of body water through sweat when you work out.

DYNAMIC DINNER

How to fill your plate with the perfect nutrient percentages

Typical American Dinner	Endurance Athlete Dinner
42% carbohydrate	60% carbohydrate
34% fat	20% fat
18% protein	20% protein
8-ounces chuck steak	8-ounces grilled wild salmon
baked potato with sour cream	brown rice pilaf
½ cup green beans	¾ cup green beans
	toasted whole wheat bread with butter

Here's How—1st Step: Trust your appetite to tell you how much more food you need to properly fuel your athletic pursuits.

It's true that determining your caloric needs can be strictly a numbers game. For example, a 130-pound sedentary woman needs to consume 1,650 calories per day to maintain her weight. But a 130-pound woman who works out an hour a day needs 2,300 calories per day to avoid losing weight. That's simply because her daily workout consumes roughly 650 calories.

Not a numbers person? That's just fine, since there's an easier way to figure out how much more you need to eat to compensate for all those miles you're logging. Research has shown that appetite increases very precisely to match athletes' increases in training (*Int J Sport Nutr Exer Metab* 02;12(3):249–267). Therefore, you can trust your appetite to tell you how much more to eat, compared to how much you would need to eat to maintain your body weight without exercise. Some weight-conscious athletes, however, purposely restrain their eating and consequently take in fewer calories than they need to fuel their training and facilitate their recovery. When this happens, your body's metabolism slows, resulting in impaired workout performance, elevated fat storage, and increased injury risk. This problem is seen most often in female athletes.

It's important that you trust your appetite and give your body all of the calories it needs to support your training. If you're concerned about your weight, concentrate on improving the *quality* of the foods you eat (more vegetables, fewer fried foods, etc.) instead of eating less.

Here's How—2nd Step: Let thirst be your guide when it comes to meeting your increased fluid needs during exercise.

The amount of extra water you need as an athlete depends on your weight, the duration and intensity of your workouts, the air temperature and humidity level during your workouts, and other factors. You can easily replace the body water you lose during training by weighing yourself immediately before and after each workout and drinking 1.5 ounces of water for every one ounce of weight you lost in the workout over the next hour or so. You can also minimize dehydration during longer workouts (those lasting over an hour) by drinking fluid while you exercise. Numerous studies have shown that drinking enhances performance during prolonged, high-intensity exercise in which substantial sweating occurs (*J Sports Sci* 04;22(1):39–55).

But how much should you drink during long exercise sessions? Contrary to some of the strict rehydration guidelines out there, it's best to let your thirst guide your drinking during exercise. Recent studies have shown that athletes who force themselves to drink ahead of their thirst gain no performance advantage and are no less likely to overheat—but they are more likely to vomit! For example, in a study from the Sports Science Institute of South Africa, runners did three 2-hour workouts while drinking a sports drink at three different rates: by thirst (roughly 400 ml or 13 ounces per hour), at a moderate rate (130 ml or about 4 ounces every 15 to 20 minutes), and at a high rate (300 ml or about 10 ounces every 15 to 20 minutes). The study found no significant differences in core body temperature or finishing times among the three trials, yet some of the subjects did suffer GI distress during the high drinking-rate trial (*Med Sci Sports Exer* 00;32(10):1783–1789).

Turns out that moderate dehydration just isn't as bad as we once thought it was. And plain old water is perfectly fine for most workouts, but during your hardest and longest workouts and races, you're better off using a sports drink. Sports drinks contain carbohydrate, which is your muscles' preferred fuel source during intense exercise. By using a sports drink during hard workouts and races, you give your muscles an extra source of quick energy, along with fluid to minimize dehydration. Studies have shown that endurance athletes perform significantly better

EAT, DRINK, AND KEEP A TALLY

A snapshot of your daily food and fluid needs

This table provides a comparison of the approximate one-day calorie and water needs of a 150-pound person who does not exercise and a 150-pound person who completes one hour of moderate-intensity aerobic exercise in a warm (70 degrees) environment. (Note that hydration needs can be met through pure water, other drinks such as fruit juice, and water-containing foods.)

	150-Pound Non-Athlete	150-Pound Endurance Athlete
Calorie Needs	2,000 calories	2,775
Water Needs	75 ounces	87 ounces

when they consume a sports drink during prolonged periods of exercise instead of water (*Med Sci Sports Exer* 08;40(2):275–281).

Perfect Your Timing

For general health and endurance performance alike, *when* you eat is as important as *what* you eat. For example, research has shown that men and women who eat more of their calories early in the day and fewer calories late in the day are less likely to be overweight than those who do the opposite. Why? Because calories consumed early in the day raise metabolism and reduce appetite more than those taken in later. But to achieve optimal athletic performance, endurance athletes need to be even more particular about how they time the meals that immediately precede and follow their workouts.

Here's How—1st Step: Eat two to four hours before your workout.

Your pre-workout meal needs to be timed so that the food has cleared from your stomach by the time you begin (to avoid GI distress during exercise), but not so early that you're hungry again, as this would indicate that your blood glucose level was dropping—a situation that would hamper your performance. The ideal time for a full-size pre-workout meal for most athletes is three to four hours before training. But a smaller meal can be eaten as late as two hours before exercise.

TIMING IS EVERYTHING

Your workouts should dictate when you eat.

Are you an early bird when it comes to working out or do you sweat it out after spending all day at the office? Take a look at how you should time your meals, depending on your workout schedule.

	Non-Athlete	Endurance Athlete #1 (Early-Morning)	Endurance Athlete #2 (After Work)
5:45 AM		Pre-workout snack	
6:00 AM		Workout	
7:00 AM	Breakfast	Breakfast/Post-workout meal	Breakfast
12:00 PM	Lunch	Lunch	Lunch
2:30 PM			Pre-workout snack
5:15 PM			Workout
6:00 PM	Dinner	Dinner	
7:00 PM			Dinner/Post-workout meal

Carbohydrates should be the centerpiece of your pre-workout meal. Vegetables and whole grains are your best choices, as the high-fiber content of these foods causes them to be absorbed more slowly for longer-lasting energy. But consuming any carbohydrate-containing food along with a little protein and/or fat will have the same effect, as the fat or protein will help slow down the absorption of the carbs. Individual athletes differ in terms of the size and content of pre-race meals that work best for them, so feel free to experiment. Once you've figured out what works best for you, make it part of your daily training routine.

Eating a perfectly timed pre-workout meal can be tricky for those who work out first thing in the morning (11 to 13 hours after the previous night's dinner) or immediately after work (5 to 6 hours after lunch). In these cases, use a pre-workout snack to boost your fuel stores and ensure that you have a stronger workout. If you train early in the morning, your pre-workout snack will likely be consumed immediately beforehand, so it should be something that is easily digested and contains little else besides carbohydrate. A piece of fruit or an energy bar should work well. If you train after work, rely on a mid-afternoon snack to top off your fuel tank. Fruit, yogurt, and whole-grain bagels are popular choices among endurance athletes.

Here's How—2nd Step: Eat one to two hours after completing a workout.

The timing of post-workout nutrition is also crucial. The body exists in a unique hormonal state during the first two hours after exercise that allows nutrients to be used much more effectively than the same nutrients consumed later. But this same hormonal state also amplifies the negative consequences of not eating and drinking immediately following a workout. In other words, you need to take full advantage of this “muscle recovery window” if your goal is to be as ready as possible for your next workout—especially if that workout is to occur later the same day.

There are four specific nutrients that you should consume within the muscle recovery window—and ideally within an hour of finishing up a workout. Water and electrolyte minerals (mainly salt) are needed to rehydrate the body. Carbohydrates are needed to replenish muscle glycogen stores and prime the immune system. And protein is needed to repair muscle damage and provide the raw materials for tissue adaptations to training.

Regular foods and beverages containing these nutrients will do the job. A tuna sandwich and side salad with a tall glass of water, for example, is a great post-workout recovery lunch menu. But sometimes recovery supplements such as post-workout drinks are more convenient, as athletes are often neither hungry nor motivated to prepare a meal immediately following a hard workout.

Get Extra Help From the Right Supplements

While real food is the foundation for good health and optimal athletic performance, certain supplements may enhance sports performance in ways that foods cannot match. Most supplements that are marketed to athletes have no value. A select few, however, are scientifically proven to benefit athletes in specific ways.

Here's How—1st Step: Enhance endurance performance with antioxidants, caffeine, and mushroom extracts.

During intense and prolonged exercise, your muscles produce large amounts of free radicals—unstable oxygen molecules that cause fatigue and post-exercise muscle soreness. Antioxidants are compounds (some of which are produced by the body, others of which are obtained in food) that neutralize free radicals and counteract these effects. Studies have shown that certain antioxidant supplements—including n-acetyl cysteine, quercetin, and green tea catechins—effectively boost endurance performance (*J of Int Soc of Sports Nutr* 05;9(2):38–44) (*Int J of Sport Nutr Exer Metab* 06;16(4):405–419) (*Am J of Physiol Regul Integr Comp Physiol* 06;290(6):R1550–1556).

Caffeine, the world's most popular drug and a nervous system stimulant, has also been proven to enhance endurance performance. It does so by increasing the efficiency of muscle contractions and reducing perceived effort—or how “hard” it feels to exercise at any given intensity (*Percept Mot Skills* 07;105(3 Pt 2):1109–1116).

Mushroom extracts are perhaps the most exciting sports nutrition supplement to come along in some time, as they too appear to boost endurance dramatically. Actually, mushroom extracts have been used in Chinese medicine for their health benefits for centuries, but their endurance

performance benefits were discovered only recently. In one study, a supplement containing mushroom extracts was found to increase swimming endurance 267 percent by increasing lactate clearance, which is your body’s ability to use lactate produced by the working muscles to fuel continued exercise (*China Academy of Medical Sciences, Beijing, China, 1997*).

Here’s How—2nd Step: Improve short-duration, high-intensity exercise performance with beta-alanine and creatine.

In short, high-intensity exercise tests such as repeated cycling sprints, the amino acid beta-alanine appears to increase endurance. Beta-alanine is used by the body to form carnosine, an acid buffer concentrated in fast-twitch muscle fibers. During intense exercise, the muscles become more acidic. When they become too acidic, fatigue occurs. Buffers such as beta-alanine reduce the rate at which the muscles become acidic and increase endurance.

Like beta-alanine, creatine supplementation appears to enhance performance in the shorter, high-intensity interval workouts that most endurance athletes do, even though creatine is typically thought of as a bodybuilder’s supplement (*J Sports Science 98;16(3):271–279*). Creatine supplements are also natural precursors to creatine phosphate, your muscles’ main provider of energy for maximum-intensity efforts.

SUPPLEMENTATION STRATEGIES

Supplement	Try it when you want to...
Antioxidants	Increase endurance and reduce muscle damage
Beta-alanine	Increase fatigue resistance in short, high-intensity efforts
Caffeine	Improve endurance performance and reduce perceived effort
Creatine	Increase fatigue resistance in short, high-intensity efforts
Mushroom extracts	Increase endurance and accelerate recovery

The Bottom Line

Athletes and non-athletes alike can boost their general health by simply eating better. But as an endurance athlete, you stand to gain much more by improving your diet—specifically when you adopt the dietary guidelines outlined in this special report. By increasing the percentage of high-quality carbs and proteins in your diet, upping your calorie and fluid intake to match your activity level, timing your eating to fuel your workouts optimally and accelerate muscle recovery, and taking advantage of the special powers of a select few nutritional supplements, you can expect to train harder, recover faster, and ultimately perform better. In other words, you can turn good food into great fuel that will propel you to peak performance.



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