# The Fueling of the
Long-Distance Runner

What to eat and drink before, during, and after long training runs and races

by Lauren Antonucci, MS, RD

Line up at the start of a marathon or half-marathon, and listen to the conversations around you. Most likely, you'll hear nervous runners chatter about their training (or lack thereof), their fitness (or lack thereof), and their eagerness to run hard (and, definitely, their lack thereof!). Mingled with these comments will be concerns about "running out of gas," "losing energy and focus," and (most dreaded of all) "hitting the wall."

When I hear this kind of talk, I'm amazed by the runners' underlying belief that they have no power to control their energy levels on race day. I've come to realize that this is because most runners—even the seemingly fit and prepared—have no nutrition plan. They talk about "the wall" as if it's some bad-luck demon over which they have no control and that they simply hope doesn't "get them" during the race.
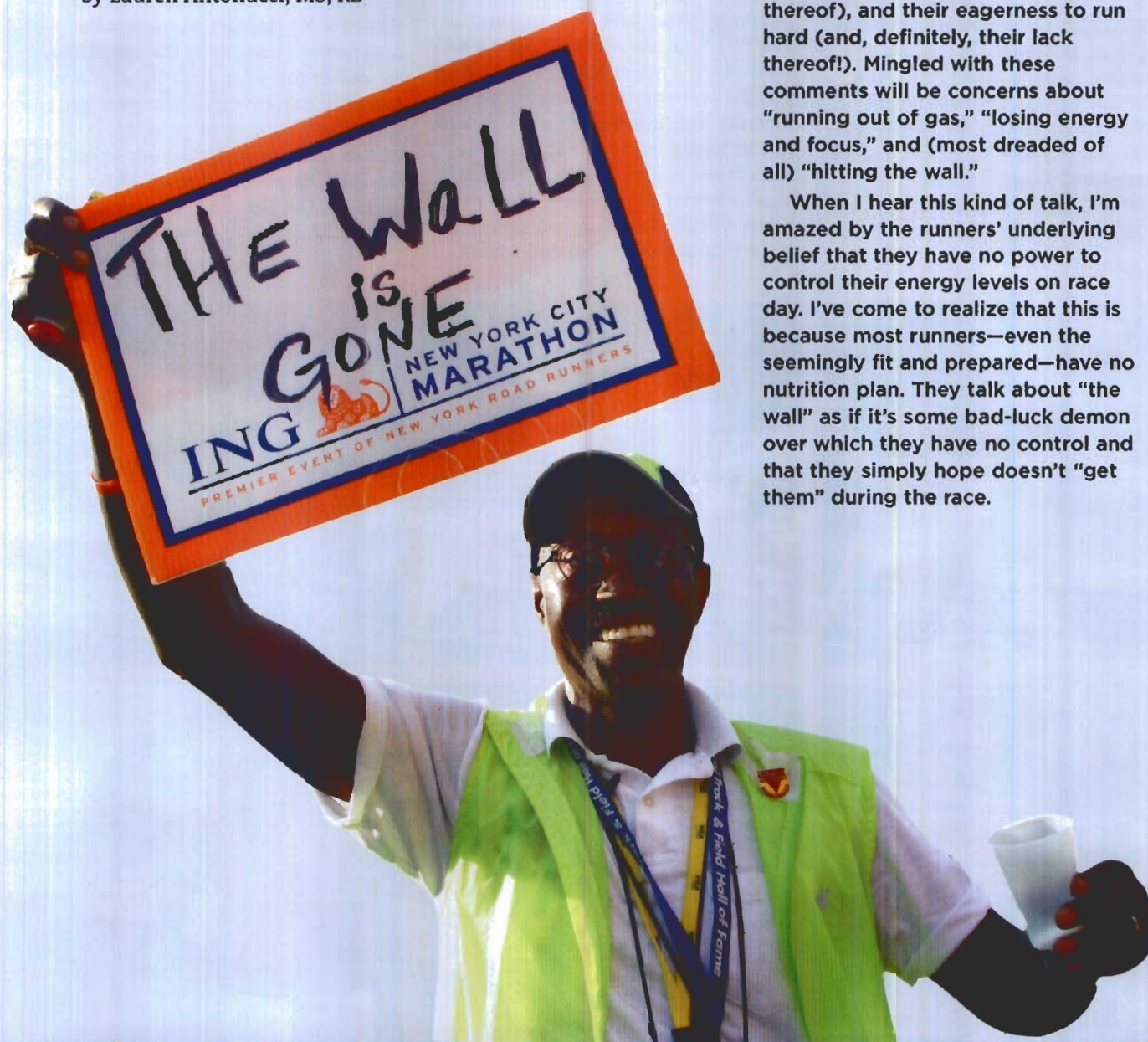
Let's Do the Numbers

Losing energy, running out of gas, hitting the wall... It's all completely avoidable, both in your long training efforts and during long races. All you need is a nutrition plan. And the time to develop your plan is now, as you log your long workouts and prepare for your big race.

The average runner expends 600 to 800 calories per hour during a distance training run or race. That same runner will burn 150 grams of carbohydrate each hour, sweat at a rate of one to one and a half liters per hour, and lose more than 1,000 milligrams (mg) of sodium per hour. These numbers really add up,

and that's why it's so important to have a plan for replenishing what you will lose during your runs. You can then practice and adjust your plan in training so that it's flawless on race day. This investment will be time well spent.

With a solid nutrition and hydration plan you will:
- **feel** better
- **perform** better
- **recover** better
- **feel** motivated to continue training and racing at a high level

> On average, a runner expends the following during an hour of running:
>
> **600-800 calories**
>
> **150 grams carbohydrate**
>
> **1.0-1.5 liters of sweat**
>
> **1,000+ milligrams sodium**

Fluids: How to Stay in Balance

During long runs and races, one of your primary goals should be to remain well hydrated—that is, neither dehydrated nor over-hydrated. Adequate hydration is especially important for runners completing the marathon in more than four hours because the longer duration of their activity increases their likelihood of over- or under-hydration.

For optimal hydration, you need to:
- Start your training runs and races well hydrated
- Maintain your hydration status throughout your run

It's easier to start off well hydrated if you get in the habit of hydrating throughout your day, every day. What does this mean? In general I recommend that female runners aim to take in at least 2.5 liters of fluid daily, and male runners at least 3.5 liters of fluid daily.

There are some simple strategies for making sure this daily hydration happens. First, keep fluids with you—in your backpack or purse, at your desk, in the car—to remind you to drink. Second, check your hydration status by noting

the color of your urine; if you are optimally hydrated it will be the color of lemonade or slightly lighter. Dark urine indicates dehydration; clear urine is a sign of overhydration. Third, make a point of drinking about 16 ounces of fluid two to three hours before exercise and an additional 8 ounces 10 to 20 minutes prior to your workout.

The experts now recommend that you drink according to your thirst during your runs. That is, if you feel thirsty, have some fluids. USA Track & Field recommends that, optimally, runners should consume 100 percent of fluids lost due to sweat while racing. This

run, as well as the environmental conditions. Do this before-and-after weighing a few times, under different conditions and for different types of runs, and you'll start to get a sense of whether you're drinking enough on the run to replace the fluids you lose. Adjust your fluid intake as needed.

By the time race day rolls around, your hydration plan should be rock-solid. It can be a challenge to keep precise track of your fluid intake along a race course, so follow the experts' advice and use thirst as your signal to drink. If you feel thirsty as you approach a fluid station (dry mouth, a cup of

> **By the time race day rolls around, your hydration plan should be rock-solid. During the race, use thirst as your signal to drink.**

means that you should aim to consume fluids equal to those you lose in sweat. To estimate your sweat rate, step on a bathroom scale before your run and then again immediately afterward; the two numbers should be the same, or close. Note your fluid intake during the

water or Gatorade seems appealing), slow down and drink. If you're not thirsty, don't drink just because you feel you "should." Continuing to check in and respond to thirst indicators every mile or so will keep you in a state of optimal hydration.

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Replacing Sodium and Electrolytes

When you sweat, you lose sodium (salt) along with fluids. Low sodium can cause muscle cramping (you've probably seen runners doubled over with muscle cramps during the final miles of a marathon) and may also lead to the rare but serious condition of hyponatremia, or water intoxication. Replacing lost sodium is especially important for runners with higher than average sweat rates and those whose sweat contains a higher than average amount of sodium. You can recognize these athletes by the white crust of salt that forms on their bodies during exercise.

Choosing a sports drink that contains at least 200 mg of sodium per 8-ounce serving, such as the Gatorade Endurance Formula served at the ING New York City Marathon and other NYRR long races, can help maintain sodium-fluid balance and reduce the risk of hyponatremia. Another strategy is to consume half a teaspoon of salt (try a salt packet from a restaurant), either on its own or added to 16 ounces of sports drink, before a long run or race and again at the halfway point.

NYRR long-distance races provide both water and Gatorade Endurance Formula along the course. Visit www.nyrr.org for the schedule of NYRR fall races; you can enter these events either as competitive efforts or as long training runs. These events are complete with mile markers, fluid stations, and plenty of company. During other training runs, you can stay hydrated and maintain your sodium-fluid balance by wearing a fuel belt, carrying fluid bottles, or using a backpack hydration system.

"Hitting the wall" during a long run or race is completely avoidable. All you need is a nutrition plan.

Finally, you want to make sure your diet during the one to two days before your long run or race contains plenty of sodium (unless a salt-heavy diet is contraindicated by your doctor): Salt your food at mealtimes and enjoy foods such as salted pretzels, baked potato chips, and canned soup.

Fueling Your Runs with Carbs

A healthy distance runner should aim to consume about 60 percent of daily calories as carbohydrates. Healthy sources of carbs include whole grains, fruits, milk, and yogurt. A good guideline is to shoot for two to three daily servings of fruit, two to three servings of low-fat or non-fat dairy, and six to eight servings of grains and starches such as baked potatoes, rice, pasta, beans, cereals, and whole-grain breads and crackers.

Failing to consume adequate carbohydrate, and failing to start their intake early.

The first mistake is easily tackled by doing the numbers. As a runner, you burn 30 to 60 grams of carbohydrate per hour during long runs. To determine your carbohydrate fueling needs, multiply each 30 to 60 grams by the number of hours you plan to run, then plan to consume that many grams of carbohy-

in your training log, and make adjustments on future runs.

The second issue is rectified by training yourself to eat before you experience low energy. I'm not sure why runners find this so challenging, but I assure you that once you get in the habit of doing it, you'll wonder why you waited so long.

There are two common on-the-run fueling mistakes: Failing to consume adequate carbohydrate and failing to start intake early.

Ideally, you should eat a carbohydrate-rich meal or snack of 400 to 600 calories two to three hours before a long run or race. If that's not possible due to time constraints, then plan to consume 100 to 200 easily digested carbohydrate calories such as a banana, a small serving of dry cereal, or 16 ounces of sports drink before you begin to run.

During your workout or race, carbohydrate will be your primary fuel source. Most runners know this, but even experienced athletes can fall prey to two common on-the-run fueling mistakes:

drate during your run. For example, if I am planning a two-hour run, I'll aim to take in 60 (30 x 2) to 120 (60 x 2) grams of carbohydrate during my run. Smaller runners should aim for the lower end of the range; larger runners should aim for the upper end.

Use your training runs to experiment with carbohydrate sources. Every runner is different; you may not handle a certain food or product in the same way your training partner does. Note your energy level, performance, any digestive issues, and other pertinent information

Fueling early and often:
- prevents symptoms of low energy (slow pace, irritability, loss of concentration)
- reduces the risk of muscle cramping
- curbs hunger

On your next long run, plan to start consuming carbs after 15 to 20 minutes and to consume more every 15 to 20 minutes after that. If needed, set your watch to beep at 20-minute intervals. This means that you will be eating and/or drinking six to eight times during a two-hour run. Sound excessive? Just try it. I guarantee you'll feel more energetic and clear-headed and will very likely maintain a faster pace with less effort than you did without a fueling plan.

Sources of Carbohydrate

This chart lists grams of carbohydrate found in a variety of foods. Most runners should aim to take in 30-60 grams of carbohydrate per hour during long training runs and races.

Source	Carbohydrate (grams)	Total calories	Best uses
8 oz Gatorade Thirst Quencher	14	50	Pre-event and during long runs to provide fluid, carbs, electrolytes
Energy gel	20–26	90–110	Calorie/carbohydrate source during long runs (take with water)
Energy bar	40–45	180–260	Pre-run for a carbohydrate boost or consumed gradually (with water) during the run
Banana (medium)	30	105	"Real food" carbohydrate alternative before or during runs
Fig bars (2)	21	100	Carbohydrate source for those who prefer to chew (take with water)

Did We Mention Protein?

Including some protein in the meal or snack that you consume one to three hours before your run will help stabilize your energy level and keep hunger at bay throughout the run. Good choices include a peanut butter and jelly sandwich on whole-grain bread, oatmeal with soy milk, or an energy bar.

Though carbohydrate is your most important energy source during long runs, you may want to add some protein (no more than six to eight grams per hour) during your long runs to see how it affects your energy and performance. Some sports drinks contain protein; read package labels. Some people, such as those with diabetes or hypoglycemia may feel and perform better when they include protein during longer runs.

Where's the Protein?

Source	Protein (grams, approximate)
1 slice of whole grain bread	3
1 egg	7
4 oz low-fat cottage cheese	13–16
8 oz low-fat yogurt	6–10
8 oz Greek-style yogurt	13–16
3 oz lean meat	20

Post-Run Fueling

After your run or race, aim to refuel within 30 minutes. This small meal or snack should include both carbohydrates (to restock stores of muscle energy, or glycogen) and about 10 to 20 grams of protein, to aid in muscle recovery. A smoothie made with fresh fruit and yogurt or low-fat milk, a turkey sandwich on wheat bead, or a glass of low-fat milk or chocolate milk will get your recovery process off to a great start.

I have worked with all types of runners over the years, and the nutritional mistakes they make are the same. Many runners, even the pros, underperform for years because they fail to pay attention to their nutrition needs. I promise you what I promise every athlete: By developing a nutrition plan, adjusting it as needed, and sticking to it on race day, you will improve your energy and endurance, race stronger and faster if you wish, and enjoy all of it more than ever. ∎