Your Complete Guide to Recovering From a Marathon

Simple steps to come back quickly and well.

BY ROY STEVENSON

When you cross the finish line of a marathon, your body is a war zone—a war zone where you've lost most of the battles. You are walking wounded and physically exhausted. It's no coincidence that well-organized marathons often have an army of medics manning the finish line.

David Costill, PhD, former head of the exercise physiology department at Ball State University, Indiana, describes what happens to your body in his book *Inside Running: Basics of Sports Physiology*. "A lot of things happen to the body as a result of running the marathon. You become overheated, dehydrated and your muscles are severely glycogen depleted. Your hormonal milieu gets thrown out of whack, and you traumatize your muscles." He adds, "You have to bide your time to get your body back in balance."

Muscle biopsies taken on hapless marathoners immediately after finishing their event consistently show ruptured fibers, inflammation, and spillage of intracellular contents outside the muscle. The list goes on: displacement of red and white blood cells, derangement and discontinuity of contractile filaments, and some hard wear and tear on the connective tissues attaching to and surrounding the muscle. It takes your muscles and skeletal system from seven to 10 days to recover, with some biopsy research showing muscle-fiber damage still lingering 30 days after a marathon.

And just for good measure, your stress hormones cortisol, glucagon, and epinephrine are dramatically elevated after the marathon. Your one and only goal when you finish your marathon should be to get your body and health back together as soon as possible. Fortunately, research on the many aspects of recovery from

endurance events is prodigious and has revealed interesting data. Many exercise scientists and coaches are comfortable enough with it to make some recommendations and guidelines that we think will enhance your postmarathon recovery. If you follow this advice, you will be back in good health and resume your normal training schedule again in the shortest possible time.

General considerations for recovery from a marathon

Are you quick to recover or slow to recover? Alas, we have to take the cards that our genetic fate has dealt us and make the best of them that we can. Our genetics are a major player in our ability to recover from marathons. Some runners are flattened for a week or three, while others are able to resume running within a few days without the slightest ache or pain.

If you consistently recover from marathons within a week, count your genetic blessings! If, like most of us, you hobble around for days after, you're going to have to live with the fact that you're slow to recover and need to plan for a longer recovery—that is, *allow two to three weeks of rest and easy running, or (gasp) actually take a few days completely off from running*.

How age affects recovery

Any masters athlete will tell you that as we age, we need more recovery time after a marathon. Over age 40, we need anywhere from three to four weeks of rest and/or recovery.

Gender and recovery

Women tend to take longer to recover from marathons than men do, largely because of hormonal differences. Testosterone, the dominant male sex hormone, plays a big role in muscle growth and repair, giving an advantage to males.

Sleep and recovery

The quality and amount of your sleep contribute significantly to your recovery from the marathon. Good sleep is essential for your body to repair itself mentally and physically. Get home and have a nap or at least lie down for an hour or two after your marathon, and go to bed at a consistent time for several weeks after the marathon.

Specific considerations for recovery from a marathon

Immediate postmarathon recovery

After crossing the finish line, keep moving, gradually slowing down to a walk, to allow your stressed system to attain a steady state and normalize. Stopping

suddenly can cause lightheadedness, dizziness, and fainting if your blood pressure drops too rapidly. A slow walking cool-down of five to 10 minutes will gently ease you back to resting state and begin the repair process of removal of metabolic wastes.

Get your feet up

Much of the soreness after a marathon is due to swelling from fluids that have accumulated between the muscles, causing pressure on nerve endings near the skin. Dr. David Costill recommends elevating your legs for a while to help ease the pain.

To massage or not?

Massage therapy is claimed to heal damaged muscle tissue, improve blood flow to the legs, relax the muscles, enhance nutrient and oxygen delivery to the muscles, and increase the removal of lactic acid.

However, the research on the recovery properties of massage therapy is disappointing. Results suggest that it is either ineffective or has only limited influence on delayed onset muscle soreness (DOMS), muscle repair, and swelling. Many marathoners find that even a light massage may be too painful immediately after the marathon. Consider waiting three to seven days after the race for your massage.

Icing

You can ice your legs every few hours after the marathon to good effect—the cold deadens the nerve pain endings, reducing your pain. An added benefit is that icing slows down the blood flow to the traumatized muscles. Icing for longer than 10 minutes dilates the arteries, increasing blood flow to the legs. This pumps out the waste products and brings in nutrients and proteins to begin the repair work. A cool shower or running cold tap water over your legs is very refreshing.

And no matter how relaxing it seems, avoid hot-tub parties after the marathon unless you want the postrace soreness to get worse. Heating adds to the microtrauma to the muscle tissues, contributing to swelling and inflammation. Saunas should also be avoided at all costs because they overheat the runner, causing further dehydration.

Heat and cold contrast therapy

Contrast therapy is used to speed up recovery from muscle injury in physical therapy clinics. It improves blood flow to the muscles, eliminating any lactate lying around, and reduces inflammation and DOMS, providing pain relief.

This therapy should be started three to four days after the marathon when the major soreness has worn off. With this technique, you apply heat to your legs from a heat pack, a hot water bottle (wrapped in a damp towel), or a hot tub for two to three minutes and then apply cold (ice cups, cold packs, or cold bath) for the same amount of time. This can also be simulated in the shower by flushing hot, then cold, water over the legs and hips. This cycle can be repeated two to five times.

Aspirin, painkillers, anti-inflammatory medications?

Your quadriceps and calf muscles will be very sore after the marathon, especially when you go down stairs or a slope. Sports medicine physicians recommend that you avoid taking painkillers and nonspecific anti-inflammatory drugs (NSAIDS), despite their palliative effects. Research shows that muscle tissue repair actually takes longer if you ingest these medications. However, if you are incapacitated and in great pain, you may have no choice but to take painkillers and NSAIDS. A disturbing trend has recently emerged among marathon runners. Many are popping NSAIDS anti-inflammatories like candy before the event. This is a potentially dangerous practice and can cause serious health problems. Do not do this, no matter how tempting it seems.

Infection

You are highly susceptible to infections after a marathon, so take extra care of any blisters or bloody toenails. Remember, recovering your health is your main goal.

Stretching

There is no conclusive research showing that stretching reduces postexercise soreness and pain after marathons. In fact, sharp, intense stretching is counterproductive, flaring up inflammation in the muscle tissues. Slow, gentle stretching within your flexibility range may help temporarily reduce stiffness.

Resuming running after a marathon

Generally, your recovery will be proportional to your mileage before the marathon. In other words, the more training you put in leading up to the marathon, the better and faster your recovery. If you feel compelled to run, workouts should be kept short and easy on a flat, soft grass surface. Your goal is to regain your usual "spring" and normal training distances without undue soreness. This usually kicks in somewhere around 12 to 21 days after the marathon.

The first week postmarathon

Postrace running does not help you recover faster from the marathon, and in fact some research shows that it hinders recovery. Drs. Robert Hikida, David Costill, and Frederick Hagerman cooperated in a marathon study (Hikida et al. 1983) conducted on 10 male marathon runners competing in the Athens Marathon at Ohio University. One group of marathoners did short, easy 20- to 45-minute treadmill running for five days after the marathon (exercise-recovery group), while a second group rested completely for five days (rest-recovery group).

Both groups had identical glycogen restoration, which suggests that light exercise does not help glycogen repletion. Indeed, the rest-recovery group had greater recovery of leg-extension strength and work capacity than the exercise-recovery group, although muscle strength still remained depressed below normal for both groups even after seven days. These findings and many other studies since raise doubts about the value of exercise during the days following an exhaustive event such as a marathon or ultramarathon. Dr. David Costill recommends not running for a full week. Despite this advice, some marathoners start running as soon as four days after the marathon—too early! The take-home lesson to be learned here is that you should avoid running and other forms of aerobic exercise for at least a week after the marathon.

The second week postmarathon

In your second week after the marathon, you're ready to resume some type of aerobic activity. Cross-training activities such as swimming, pool running, or cycling on a stationary exercise bike will give your legs a break from the high-impact pounding of running, while still giving you a solid cardiovascular workout. Weight-training exercises for the legs should be avoided for three weeks, as they will delay the healing of muscle tissue in your legs.

How long should these cross-training sessions be? Many marathoners say the best part of running marathons is that they get to take a few easy weeks before and after the marathon. You should exercise as you feel, for as long or as short as you feel. Certainly there is no point in doing workouts lasting more than 30 to 45 minutes, as your prime goal is to fully recover, not to improve your fitness.

The third and fourth weeks postmarathon

You are probably ready to start jogging again in the third week after the marathon if you felt OK after the week of easy cross-training. Common sense tells us to avoid speed training and intervals during this recovery phase. How often should you run when starting again? Running short and slow every second day is a good guideline.

The intensity of your training efforts should be low, about 55 to 65 percent of your maximal heart rate. Don't be afraid to take a day of complete rest when needed. By the fourth week, you should be feeling renewed and fresh again. If you are still fatigued in your second and third recovery weeks, your body will not adapt properly and your immune system will be impaired, making you more susceptible to any bacteria and infections going around.

Running surfaces

Some surfaces will assist your recovery more than others. Run on the softest surface you can find to reduce impact, and continue to do this for a week or two. Running on grass, sawdust, a treadmill, or dirt surfaces significantly reduces landing shock. At the very least, jog around a large grassy sports field. (Soccer fields are ideal.) Concrete and asphalt should be avoided at all costs, as they are the hardest surfaces.

When do you know you are fully recovered?

You are recovered when your legs are no longer stiff and sore, and your muscles are not sore to the touch. You should also have regained your energy for daily activities, and your health should be resilient again.

When can you race again?

The higher your premarathon mileage, the sooner you can race. As your fitness level improves, your recovery will improve and be shorter. As a general guideline, waiting two months before your next all-out marathon or race is recommended. Whenever you have regained your normal training "feel," be warned—there may be a false recovery for a week or so, during which time you feel fine. Racing during this phase may put you back in the limping mode. It's best to wait a week or two longer until you are completely recovered. Common sense also tells us to avoid speed training and intervals during this recovery phase.

Nutritional strategies for recovering from a marathon

Hundreds of research papers point to several nutritional strategies that can speed up our postmarathon recovery. They are rehydration, glycogen resynthesis, and protein and antioxidant supplementation. These techniques replenish our muscle fuel supplies, hasten the repair of muscle damage, and combat free-radical formation in our cells.

But the devil is in the details. You can pop vitamin pills, drink protein powder shakes, guzzle sports drinks, and eat all the carbohydrates you can stomach, but if you don't eat and drink the right kinds of food, drink, and supplements

at the right times, you will be wasting your time and money. It's not just what you eat, but when you eat it, that counts in your recovery. Here is how to use recovery nutrition to get the most out of yourself after your racing and hard training efforts.

Postrace and posttraining rehydration—replacing water and electrolytes

Your first priority is to fully replace muscle and plasma fluid and electrolyte losses immediately after the marathon. Weigh yourself before and after the marathon, and make sure you drink the lost weight back on within an hour or two of finishing. In fact, aim to drink 125 percent of the weight you lost from sweating because you still continue to sweat while you are rehydrating.

Recent research shows that we absorb more fluid when electrolytes are added to water, thus achieving better restoration of body water. Sodium in particular helps our body retain water, stimulates thirst, and prevents low plasma sodium.

Choose carbohydrate-rich fluids to replace your lost water, electrolytes, and muscle glycogen. Reading the labels of sports drinks is important because many of them are simply soft drinks in disguise, with excess amounts of sugar, caffeine, and other unnecessary stimulants. Select fruit juices or reputable sports drinks according to your preference—and no rule says you can't drink both.

You will know you are rehydrating adequately when you start urinating again, which can be several hours after the marathon. Urine should be clear and pale. Despite the refreshing taste, beer (or any alcohol) is counterproductive to good recovery because its diuretic effect prevents you from rehydrating properly at a critical time.

Dozens of research papers have investigated glycogen depletion and replenishment after marathons. All find the same thing—your muscle cells have experienced severe glycogen depletion. The studies conclude that complete repletion of glycogen stores requires a high-carbohydrate diet for at least 46 hours and is most rapid during the first 10 hours of recovery.

Nutritional Recovery Goals after a Marathon

- Replace fluids and electrolytes
- Replenish energy stores (glycogen and ATP, for example)
- Hasten muscle, tendon, and ligament tissue repair
- Reduce residual delayed onset muscle soreness (DOMS) and pain
- Return immune system to healthy status

High-Glycemic-Index Foods and Drinks

- Bagels
- Baked potatoes
- Bread
- Crackers
- Honey
- Maple syrup
- Raisins
- White rice
- Sports drinks (with sugar)
- Jelly beans
- Dates (dried)
- Pineapples
- Apricots (canned)

Carbohydrates consumed immediately after and from two to five hours after exercise enhance muscle-glycogen restoration. This enhancement is most effective if the carbohydrates are ingested from fluid, because fluid absorption is faster than digestion of solid carbohydrate foods. Edward Coyle, PhD, exercise physiologist at the University of Texas, Austin, says the glycogen you can get into your system within the first two hours of stopping is the most crucial. "The muscles absorb glycogen like a sponge," he says, but "four to six hours after the race, the absorption rate starts to decline."

What carbohydrates should we be ingesting after the marathon? As we know, some carbohydrates cause a rapid rise in blood-sugar levels (high glycemic index), while others promote a slower release of sugars into the bloodstream (low glycemic index). We should aim to eat and drink high-glycemic-index foods to boost our blood-glucose levels quickly, thus causing a fast release of insulin, which in turn drives more glycogen into the muscle cells.

How much carbohydrate should we take in? The recommended dose is *0.5 to 0.75 grams of carbohydrate for every pound of body weight*. A second dose of high-glycemic-index carbohydrates is recommended from one to four hours postexercise.

A carbohydrate/protein mix replenishes glycogen stores faster

Researchers have discovered that carbohydrate solutions, when mixed with protein, have an important benefit (Millard-Stafford et al. 2008). This mix of protein and carbohydrate taken immediately after running tops up our glycogen and amino-acid stores much faster than a carbohydrate solution only.

The consensus is that carbohydrate/protein mixes double the insulin response and increase the rate of glycogen synthesis by 30 percent. Why are these insulin responses desirable? Insulin is the hormone that deposits sugar into our muscle cells, so it follows that a solution that creates a high insulin response will build high intramuscular glycogen levels—and do so quickly.

Eating solid foods after a marathon

Having participated in several marathons and having witnessed the thresher shark-like feeding frenzy at the finish line, I know that runners are obviously ready almost immediately for solid foods. These should include fruit such as bananas to replace your potassium losses. Choose fruits that contain iron, zinc, calcium, chromium, sodium, and magnesium.

Four hours after the race, you should be recovered enough to eat a full mixed meal, including some protein along with the usual carbohydrates. It's commonly reported that marathoners have a craving for high-protein foods after the event. For several days after the race, your overall carbohydrate intake should be 65 percent or more of your total caloric intake—that is, if you can stand the sight of another plate of spaghetti or slice of bread.

The role of vitamins and antioxidants in muscle repair

Vitamins assist in growth, repair of tissue damage, and disarming free radical damage from stressful activity. A strong case can be presented in favor of antioxidant vitamins being taken to hasten recovery of damaged muscle and connective tissue, free-radical damage, immune-system suppression, and oxidative stress caused by running.

Antioxidants, produced naturally in the body or obtained from our food, block most free-radical reactions. Evidence exists that certain antioxidant supplements reduce free-radical damage in runners. One study found that five months of vitamin E supplementation in racing cyclists reduced markers of oxidative stress induced by extreme endurance exercise (Hellsten et al. 1996).

How much protein is needed for this synergistic glycogen-building effect?

- Runners should ingest 0.4 g/kg of body weight of protein immediately after training and again two hours later.
- The protein is best absorbed in the form of whey or casein powder. These powders come in several flavors and can be found in nutrition or sports-nutrition stores.
- There has also been a big fuss lately about how low-fat chocolate milk is an ideal postrunning fluid for enhancing glycogen stores because of its good ratio of carbohydrate to protein. If you like chocolate milk, then by all means have at it!

Guidelines for Vitamin and Antioxidant Supplementation

- Take your multivitamin supplement with a meal to enhance absorption.
- Choose a supplement in which the majority of vitamin A is actually beta carotene. Vitamin A, or retinol, should not exceed 3,000 IU daily.
- A blend of synthetic and natural supplements is fine. Look for a mix of vitamin E from tocopherols and tocotrienols. Don't pay more for "time-release" or "chelated" products.
- If you take antioxidant supplements, keep doses to 100 to 200 IU of vitamin E and 250 milligrams of vitamin C.
- Choose a multivitamin in which the vitamin D source is D3, or cholecalciferol, the type that is best absorbed.

Some studies show that vitamin E can reduce leakage of cell membranes and result in lower levels of creatine kinase (an enzymatic marker of muscle stress) and several other indicators of oxidative stress in runners (Itoh et al. 2000). Another study found that 3 grams/day of vitamin C administered for two weeks before and two weeks after damaging eccentric exercise significantly reduced DOMS in their running subjects (Dawson et al. 2002).

Monique Ryan, in her excellent book *Sports Nutrition for Endurance Athletes*, summarizes: "For endurance athletes they [supplements] are crucially important. Because of your training and stress it imposes on your body, you may need higher amounts of vitamins and minerals than sedentary people. And, as an athlete, you have a highly vested interest in keeping your immune system healthy so that illness does not put a halt to your training." She continues, "Vitamins and minerals are essential for metabolizing energy, building body tissue, maintaining fluid balance, and carrying oxygen in the body. Vitamins and minerals also play a role in reducing the oxidative stress that is brought on by endurance training."

Immune-system recovery after a marathon

Only one nutritional substance has been shown to enhance the immune system: drinking a carbohydrate solution during and after endurance exercise. Drinking one liter per hour of typical sports drinks has been shown to lower blood cortisol and epinephrine levels, reduce adverse changes in blood immune cells, and lower anti-inflammatory cytokine levels (Nieman 1998).

Proteins also play an important role in helping our body fight off infection, especially in the two hours or so after exercise when we're particularly susceptible to catching upper respiratory tract infections. As proteins make up the infection-fighting agents like macrophages, natural killer cells, immunoglobins, and white blood cells, ingesting proteins after strenuous running will, in all probability, help us fight any intruding infections and bacteria. The roles of carbohydrate solutions and protein supplementation have been discussed thoroughly in the previous sections of this article.

If a marathoner uses this multidisciplined approach of therapeutic and nutritional strategies for recovery after the 26.2-mile event, his or her body will bounce back in its shortest time possible. Follow these guidelines to regaining your health and your game after your marathon, and always be aware of the severe damage that you have done to your body in the race. Remember, when in doubt, it's wiser to take it easier rather than push yourself.

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