

TIMING IT RIGHT

Making the most of an athlete's nutritional intake is as much about when as what. Here's an in-depth look at nutrient timing and nutrition periodization.

By Laura Ulrich

When nutritionists talk to athletes, advice most often centers around what they should eat. Without the right mix of carbohydrates, protein, vitamins, and minerals, an athlete's body will be unable to reach its potential.

However, recent research shows that athletes who focus exclusively on what they eat are missing half the equation: When they eat is just as important. In fact, studies suggest that the timing of nutrition is so critical that if two athletes consume exactly the same diet and perform exactly the same training, the athlete who times his or her eating correctly will make more performance gains than the one who doesn't.

Todd Wright, CSCS, Strength and Conditioning Coach for the men's basketball team at the University of Texas, has seen this firsthand. By carefully timing his athletes' nutrition intake one season, Wright saw one player drop 73 pounds, another player who needed to add lean mass gain 22 pounds, and

his entire team perform better than anticipated, making it to the Big 12 championship game and finishing with a No. 16 national ranking.

“Out of our regular seven-man rotation, five of our players were freshmen,” Wright says. “I firmly believe that timing our nutrition gave them the edge to achieve more than anyone expected. It’s one of the best tools in our toolbox. We’ve taken advantage of it, and it’s made the difference for us.”

To truly benefit from timing their nutrition, athletes need to understand how to schedule their meals and snacks across each 24-hour period ... and how to adjust their eating across the course of an entire year.

To truly benefit from timing their nutrition, athletes need to focus on both the small and large pictures. On one hand, they need to understand how to schedule their meals and snacks across each 24-hour period so they arrive at workouts well fueled and are able to maximize their recovery afterward, a concept known as nutrient timing. In the bigger picture, athletes need to know how to adjust their eating across the course of an entire year, so that whether it’s the off-season, preseason, or height of competition, their bodies are getting the right nutrition when they need it. This concept is known as nutrition periodization.

NUTRIENT TIMING

John Ivy, PhD, Professor of Kinesiology and Health Education at Texas, has spent more than a decade studying how athletes can time their eating across the course of a day to optimize their bodies’ response to training.

In 2004, Ivy and co-author Robert Portman published the results of this work in a book titled *Nutrient Timing: The Future of Sports Nutrition*.

“Over a period of 15 years, we looked at one main question: How does the timing of nutrition relative to exercise influence glycogen storage and protein synthesis?” Ivy says. “The answers to that question became the basis for the nutrient timing system.”

Ivy’s system breaks an athlete’s day into three phases: the energy phase, the anabolic phase, and the growth phase. Each comes with its own set of nutrition recommendations based on what’s happening within the athlete’s body.

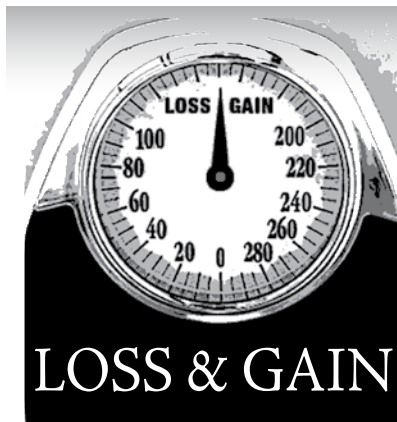
The energy phase: In nutrient timing parlance, the part of the day when an athlete is working out or competing is called the energy phase. During this time, the body is using high levels of three hormones—cortisol, catecholamine, and glucagon— to break down muscle glycogen, liver glycogen, and adipose tissue, sending them to hardworking muscles. This breakdown state is known as catabolism.

The main advice for nutritional intake during this phase is no surprise. “First and foremost, hydration is important,” Ivy says. “Replacing carbohydrates and electrolytes is the next goal, so we recommend ingesting that fluid in the form of a sports drink containing four to six percent carbohydrate and a basic electrolyte combination.

“More specific nutrition recommendations during the energy phase vary somewhat based on what kind of exercise the athlete is performing and how intense it is,” Ivy continues. “As a guideline, if the athlete is practicing or playing at 70 percent of VO_2 max, he or she needs to consume about 200 to 300 milliliters of fluid every 20 minutes.”

Ivy’s next piece of advice, however, differs from standard protocol: He suggests focusing on drinks that contain some protein during exercise, as long as an athlete can tolerate it. “Not everyone agrees, but we’ve found that a small amount of protein during a workout helps reduce muscle damage and soreness and may actually improve performance,” he says.

For an athlete in the weightroom, protein becomes even more of a focus. “Right before a weightroom workout, I recommend that athletes consume a carbohydrate-containing sports drink that is two to three percent protein,” Ivy says. “It will reduce muscle damage and help protein synthesis post-exercise. During the workout, the athlete should continue hydrating by drinking water or a sports drink.”



When athletes need to lose or gain weight, conventional wisdom says that a calorie is a calorie and raising or lowering their intake should do the trick. In reality, however, timing those calories right can make a big difference.

That strategy was key for Todd Wright, CSCS, Strength and Conditioning Coach for the men's basketball team at the University

of Texas, during the the 2006-07 season. When the men's team reported for training the summer before, two freshman athletes had big weight goals to accomplish. At 6-foot-10 and 367 pounds, Dexter Pittman needed to drop weight. And at 6-foot-9 and 200 pounds, Kevin Durant needed to bulk up.

Both players saw remarkable results. By the end of the summer, Durant had gained 22 pounds. Pittman's goal took a bit longer, but over the course of the season, he lost 73 pounds. “Neither of those things would have been possible without nutrient timing,” Wright says. “Both of them worked extremely hard, but applying nutrient timing was what allowed that work to pay off.”

With Durant, Wright focused on getting him to eat frequently, adding 300 to 400 calories to his

The anabolic phase: While the athlete works out, three key things happen in his or her body that prepare it for a transition from catabolism to anabolism. First, a large number of glucose transporters move to the outside of the cells' plasma membrane, ready to pick up any glucose that enters the bloodstream and transport it to the muscles where it can be used to replenish glycogen stores. Next, the athlete's sensitivity to insulin

daily diet by having him take in high quality carbohydrate, protein, and fat at each meal, while also snacking often between meals. But the real key was getting him to capture the crucial window after each workout when his body was primed for protein synthesis. Wright did this by making sure Durant consumed carbohydrate and protein immediately after each of his summer workouts and a light meal containing both macronutrients about two hours later.

"That was crucial," Wright says. "If he hadn't been capturing those windows, it wouldn't have mattered how hard he worked. He would not have gained that much lean mass in just eight weeks."

With Pittman, Wright also focused on frequent eating, but with the goal of cutting down overall

calories. "We had him eat six or seven small meals a day with a lot of water," Wright says. "Except for during the post-workout window, we cut out high glycemic index foods, so the majority of the time, we kept his insulin and cortisol low, which helps with weight loss.

"But post-exercise, we made sure he had a high-carb recovery food, because that was when his body was ready to convert the glucose to muscle glycogen, not store it as fat," Wright continues. "His training volume was much higher than Durant's, and with all that training, he started dropping weight like crazy. But if we hadn't timed his nutrition, he wouldn't have been able to recover from those intense sessions to sustain the workload that helped him lose 73 pounds."

steadily increases, preparing muscles for even better glycogen storage. Lastly, the athlete's body gears up to synthesize new proteins, a function it can perform faster post-exercise than at any other time. "Thanks to these factors, even when the body is in a catabolic state, it's preparing for a period of intense anabolism, or rebuilding, right after exercise," Ivy says.

"If you provide the right nutrients immediately, you can convert the catabolic state to a highly anabolic state in which the athlete rapidly increases muscle glycogen and protein synthesis."

However, there's a catch. The body will not automatically transition from catabolism to anabolism when the athlete stops working out. "Post-exercise, catabolic hormones are still high and the body is still breaking down muscle protein," Ivy says. "It won't really start recovering until you do something about it—and doing something means putting the right nutrients in.

"If you provide the right nutrients immediately, you can convert the catabolic state to a highly anabolic state in which the athlete rapidly increases muscle glycogen and protein synthesis," he continues. "But if you delay the nutrients, even if you provide them later on, you'll never get the same effect. Once you miss the window, it's gone."

The size of the window is not an exact science. "We know that waiting two hours to provide the nutrients is way too long," he says. "But is half an hour better than 45 minutes? We're not sure. My personal belief is, the sooner the better. The quicker you interrupt the catabolic state, the better."

What are the right nutrients? After practices and competitions that focus on aerobic output, in addition to consuming enough fluid to replace 150 percent of what they lost, athletes need between 1.0 and 1.5 grams of carbohydrate per kilogram of body weight (depending on how hard they worked out). And they need 0.3 to 0.4 grams of protein per kilogram of body weight. After weightroom sessions, the recommendations are essentially the same, but with a slightly higher emphasis on protein—0.5 grams per kilogram of body weight.

Two hours later, it's important for the athlete to eat again. "This should be a light meal, and it should contain both protein and carbohydrate," Ivy says. "This keeps the process of anabolism going. Over the two hours since their post-exercise nutrients, the concentration of amino acids in the athlete's blood have dropped, along with insulin and glucose levels. The second meal causes them to spike again and keeps the recovery process going."

The growth phase: What about the rest of the day? Four hours post-exercise, the athlete should eat another light meal. Then, over the next 16 hours, he or she needs to eat every few hours, focusing on basic healthy nutrition. "Simply maintaining a balanced diet of carbohydrate, protein, fruits, and vegetables during that time is all that's needed," Ivy says.

MAKING IT HAPPEN

Wright's first step in implementing the nutrient timing system with his athletes is educating them—but he doesn't give a lecture on cortisol, glycogen, and metabolism. "When you start talking that way, you lose them," he says. "Instead, I use analogies they can quickly understand and I break down the recommendations to make them simpler."

To encourage athletes to fuel throughout the day and during workouts, Wright tells them to think of their bodies as racecars. "A car needs to start the race fully fueled and the driver needs to keep fueling to maintain performance," he says. "I explain the recommendations about carbs and

protein by telling them they can't just put anything in the gas tank—the fuel has to be the right formula or the car won't run well."

To help athletes focus on fueling during the anabolic period, Wright describes the post-exercise time as a window that's closing. "I tell them, 'At the end of your workout, all the windows in your muscles are wide open for about 45 minutes. When you put nutrients in then, they can accept them and replace all the energy you just used up,'" he says. "But as the 45 minutes tick away, the windows start to close. When you put nutrients in after that, it's like trying to push them through a closed window—it just doesn't work."

To ensure that they take advantage of the window, Wright provides a sports drink with both carbohydrate and protein to each athlete immediately after practices and workouts and makes sure they drink it. "They're thirsty and probably don't feel like eating, so this is the best way for them to get the nutrients they need," he says.

Bob Seebohar, MS, RD, CSSD, CSCS, a private nutrition coach and former Director of Sports Nutrition for the University of Florida who most recently served as sport dietitian for the US Olympic Committee, agrees that getting athletes to consume post-exercise nutrition can be difficult. "They don't feel like eating, and scheduling can be a problem, too," he says. "When they leave the field, they go to get treatments, sit in an ice bath, or take a shower—and then they're ready to eat. But by then, they've missed the window. So it's important to have something available with carbs and protein that's easy for them to consume immediately."

Seebohar's solution at Florida was to provide liquid recovery meals immediately after practice, including powdered drinks and milk-based fruit smoothies. "A lot of things will work, as long as they are convenient and the athlete can tolerate them," he says. "A protein-containing energy bar works great, and so does a lean-meat sandwich."

Paul Goldberg, MS, RD, CSCS, CSSD, Strength and Conditioning Coach for the NHL's Colorado Avalanche, believes it's also important to

focus on mental recovery during the anabolic phase. “If a player is stressed from an intense game, his cortisol levels are going to remain high, which will hamper his physical recovery,” he says. “We focus on bringing those catabolic hormones down by getting players to relax through stretching, massage therapy, or talking about what happened during the game. The mind and body are connected, and if a player is still stressed from the game, his stress hormones are not going to come down.”

For the growth phase, or the time period before the next workout or game, Wright reminds players to eat healthy foods at regular intervals by asking them to envision their metabolism as a campfire. “We tell them they need to get the fire burning first thing in the morning by throwing some fuel on it,” he says. “And unless they put more nutrients in regularly,

“In the short term, they’ll see even after a few days that they’re recovering better from their workouts, are less sore, and have more energy for their next workout.”

the fire will burn out, so every two or three hours, they need to throw another log on by eating some healthy food.

“It’s also helpful to provide them with some ideas for healthy meals and snacks that combine protein and carbohydrate,” Wright continues. “I give them lots of examples of foods to have two hours post-exercise, as well as tips on what to look for in a healthy dinner.”

Goldberg has taken it a step further, gathering menus from 60 to 70 restaurants in the Denver area and other cities where his team frequently travels. “I keep them in my office,” he says. “My players come in and say, ‘We’re going here to eat,’ and I can tell them exactly what they should choose and what to avoid.”

Giving athletes a chance to experience the results of properly timing their nutrients can often be the best way to convince them of its value. “If you can get them to give it a try, even for a short period, they’ll usually buy in,” Ivy says. “In the short term, they’ll see even after a few days that they’re recovering better from their workouts, are less sore, and have more energy for their next workout. In the longer run, after about three months, they’ll see big strength and performance gains.”

NUTRITION PERIODIZATION

The nutrient timing system provides guidance over the course of a day, but athletes also need to time their nutrition for the bigger picture. Different phases of the year place different demands on athletes’ bodies, and to respond optimally, they must adjust what they eat to match. Seebohar has been studying this concept for nine years, and in 2004, he authored a book, *Nutrition Periodization for Endurance Athletes: Taking Traditional Sports Nutrition to the Next Level*, to summarize his conclusions.

“We’re all familiar with periodization as it relates to training cycles, and we wouldn’t think of asking an athlete to train the same way day in and day out over the course of a year,” says Seebohar. “But when you look at an athlete’s nutrition, often you’ll find they’re eating the same way week in and week out, regardless of how their training changes. That sets them up for trouble.”

Seebohar suggests thinking of training cycles like waves, with times of higher volume and intensity as the peaks, and times of lower intensity as the valleys. If an athlete’s nutritional intake is a constant—a straight line through the waves—they’ll be taking in too little nutrition during the peaks and then eating too much during the valleys.

“An athlete who ignores nutrition periodization will often be left without enough energy to complete workouts, or they’ll gain weight and not understand why,” Seebohar says. “Both can hurt their performance.”

“To avoid those pitfalls, nutrition needs to vary along with training cycles,” he continues. “Whenever there is a volume or intensity change, you should implement a corresponding nutrition change.”

Preseason: When athletes’ training volume and intensity is highest, the emphasis is on consuming enough nutrients to sustain the workload. Seebohar stresses daily preparation for workouts, urging athletes to fuel up one to two hours before a training session. He also emphasizes recovery using nutrient timing concepts. Often athletes need to eat the most calories during this phase of training, which may require them to push themselves to eat more than they are initially comfortable with. Fortunately, the body adapts, and athletes can generally handle more calories slowly as they get used to it. (See Chapter Two for more insights on how to help athletes consume enough calories.)

“To recover from game to game, they need to eat every two or three hours. It doesn’t have to be a full meal—it can be a piece of fruit and a granola bar. “

In-season: Once athletes are competing, their training volume usually goes down and the goal is to maintain the strength and endurance they have built. At this point, it’s time to reduce calories. However, athletes still need a steady stream of energy, so Seebohar recommends stressing smaller, more frequent meals and avoiding long periods without a meal or snack.

“I can’t tell you how many high school and college athletes I meet who eat once a day,” Seebohar says. “To recover from game to game, they need to eat every two or three hours. It doesn’t have to be a full meal—it can be a piece of fruit and a granola bar. This works great during the competitive

season, because frequent eating causes them to naturally curb their calories a little bit while still maintaining energy.”

Hydration is another big focus in-season. “Athletes who were doing great with hydrating in the preseason can forget to maintain it in-season,” Seebohar says. “I tell them to carry a water bottle, and make sure they’re urinating every two to three hours. If they’re not, they aren’t drinking enough.”

Off-season: Reduced training can easily lead to unwanted weight gain, so athletes need another plan for this time period. “If they have at least three to four weeks when they’re not doing very much training, it’s critical to alter their eating to reflect that,” Seebohar says. “That is the time when their weight can start creeping up, and if you don’t control the calories, they’ll arrive at preseason training needing to lose 20 pounds.”

Preventing weight gain entails adding lots of fruits and vegetables to boost fiber, which makes athletes feel full. It also means making sure they include a lean protein source every time they eat, rather than filling up on carbohydrates alone. “In the off-season, I tell athletes they should never be eating from just one food group,” Seebohar says. “Every time they eat, they need some carbs, some lean protein, and a fruit or vegetable.”

If athletes are using the off-season to gain lean muscle mass, then boosting calories once again may need to be the focus. See “Case Study: Gaining Weight” on page 173 for specific advice on gaining weight.

Implementing nutrition periodization also requires communicating about it frequently. “Start by explaining the concepts—just the idea that their eating needs to vary with their training will be new to most,” Seebohar says. “Then keep them abreast of changes that are coming up and why. For example, a few weeks before the end of the season, give them a heads-up that you’re going to ask them to change the way they eat. Always give them a road map for where you’re going with their nutrition.”

“Talking with athletes about this concept is key,” Goldberg agrees. “When it comes to nutrition, I have found that the more I educate my players and the more they know what to expect, the more likely they are to follow my recommendations.”



Laura Ulrich is a contributing writer for Training & Conditioning.

More nutrition articles from Training & Conditioning can be found at:

www.training-conditioning.com/nutrition.php.