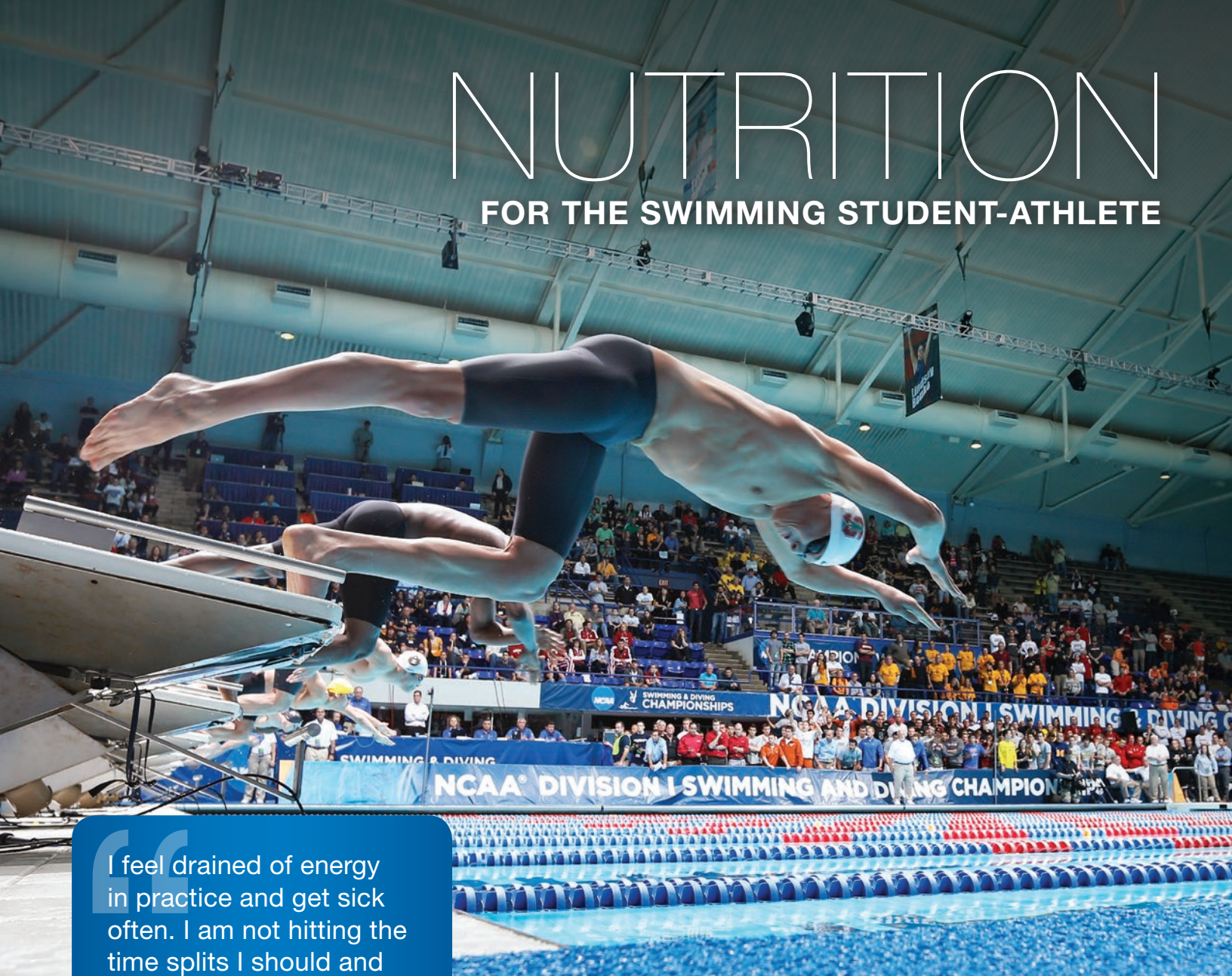


# NUTRITION

## FOR THE SWIMMING STUDENT-ATHLETE



PHOTOS FROM NCAA PHOTOS ARCHIVE AND SHUTTERSTOCK

I feel drained of energy in practice and get sick often. I am not hitting the time splits I should and can't recover between sets. I'm tired all the time, even when I get extra sleep. I feel like I am a good eater and it should be helping, but something is wrong. What can I change with my eating to help me have more energy and recover?

Swimming is a sport in which success centers on power, speed and endurance. This is achieved through periodized training programs, which involve swimming and dry-land conditioning exercise sessions. A swimmer's training targets physiological adaptations that enhance both aerobic and anaerobic energy systems. Swimming requires a sound nutrition foundation to ensure that energy and nutrient needs are met and allow for recovery between practices.

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## TRAINING

It's vital that you adopt a solid nutrition foundation during training to improve your energy systems, strength and power. There are four key nutrient groups to focus on to ensure effective fueling for – and recovering between – practices and conditioning sessions:

- Carbohydrates
- Proteins
- Fluids
- Iron-rich foods

**Carbohydrates.** Carbohydrates are stored in the muscle and liver as glycogen. Glycogen is broken down and oxidized, providing energy to sustain pool and weight room workout sessions. Sufficient intake is necessary to prevent muscle stores from being used during training and to prevent fatigue and muscle soreness. Depending on your practice, phase of the training cycle, and individual goals, your needs for carbohydrate intake can vary from 3 to 10 grams per kilogram of body weight per day. Carbohydrates are used at a higher rate during high intensity, and consequently intake should be toward the upper end of the range to restore glycogen stores. Swimmers need to consume carbohydrates throughout the day both at meals and surrounding training sessions.

**Proteins.** Adequate protein intake is essential to achieving optimal training adaptations. Swimmers need to consume 20 to 25 grams of high-quality proteins after a swim practice or strength training session. Similar quantities of protein should be consumed at meals and snacks totaling four to five times a day. High-quality proteins include lean meats, fish, yogurt (especially Greek), cheese, cottage cheese, eggs, quinoa, edamame and tofu.

**Fluids.** Swimmers need to follow a hydration plan. Being in water during practice hinders your ability to feel fluid losses via sweating, and as a result, you might not realize how much fluid is lost during practice. A fluid loss of as little as 2 percent of body weight can impair training and performance.

**Iron.** Iron is an essential nutrient that must be consumed through the diet. It is a component of proteins that deliver oxygen to muscles. It also is involved in energy production and immune system maintenance. Iron depletion and anemia can lead to fatigue, decreased immunity, and decreased performance while you're in the pool. There are two types of iron: heme (found only in animal foods) and non-heme (present in both animal and plant foods). Of these two types, heme iron is better absorbed.



## COMPETITION

Most swimmers decrease their training load during the days and weeks leading up to a championship invitational meet. This reduction in training volume, known as a taper, is designed to eliminate any lingering fatigue and maximize training adaptations to optimize race performance. A taper typically lasts eight to 21 days and is characterized by progressive decreases in training where intensity and frequency of training remain constant. Taper programs should be individualized; they can vary between swimmers. During a taper, a swimmer's energy expenditure is decreased, and therefore the swimmer's energy intake also should decrease to prevent significant changes in body composition.

Swimming invitationals consist of sessions in both the morning and evening, and they extend over successive days. Competition schedules can vary greatly. One swimmer may only compete in two events throughout the entire duration of the meet, whereas another swimmer may be competing in four or five events daily. Swimmers competing in multiple events daily require a fuel plan to ensure they are maintaining their fuel stores and recovering between races.

A pre-race meal should be consumed one to two hours before warm-up.

Between races, you should consume sports drinks and carbohydrate snacks. Within one hour of your last event of a session, you'll need to consume a recovery protein-carbohydrate combination. This is most commonly consumed in the form of a shake or smoothie. Meals and snacks between events should all consist of food items that are familiar to you and are well-tolerated.

## OFFSEASON

After a championship invitational, swimmers often take a few weeks off to rest and allow for both a physical and physiological break from training. Although minor gains in weight and body composition are to be expected during the offseason, your energy needs are significantly decreased at this time, and therefore portion sizes at meals should be reduced to prevent significant changes in weight and body composition. The decrease in energy intake should primarily come from a reduction in carbohydrates because of your reduced muscle store needs. Protein intake should remain constant to aid in conserving muscle mass. You should also focus on eating nutrient-dense fruits and vegetables. Swimmers do not require sports drinks and sports foods during this time.

## PRACTICAL STRATEGIES FOR CONSUMING CARBOHYDRATES

**Meals:** Include carbohydrates from each category at every meal:

- **Starches:** 100 percent whole-grain bread products, brown rice or wild rice, potatoes and sweet potatoes, whole-grain pasta, beans, oatmeal, whole-grain cereals
- **Fruits:** Melons, berries, tropical fruits, apples, pears, fruit cups in 100 percent juice, dried fruit, applesauce, 100 percent fruit juice
- **Dairy and dairy alternatives:** low-fat milk, soy milk, flavored almond milk, yogurt

**Snacks:** Focus on convenient items that sit well in your stomach during practice: granola bars, whole-grain crackers, fruit, pressed fruit products, dried fruit, yogurt, milk, sports bars, sports drinks, sports chews



## PRACTICAL STRATEGIES TO PREVENT DEHYDRATION

- Start drinking water as soon as you wake up.
- Carry a bottle around with you throughout the day.
- Drink multiple glasses at meals.
- Have a bottle easily accessible on the deck and sip between sets.
- Rely on sports drinks during high-intensity practices.
- Replace electrolytes lost through sweat by salting your food at meals.
- Monitor your urine color and volume.



## PRACTICAL STRATEGIES TO INCREASE IRON STORES

- Incorporate iron-rich foods into your meals:
  - Heme: sirloin steak, lean ground beef, pork chops, pork tenderloin, skinless chicken thighs, chicken breasts, fish, shellfish
  - Non-heme: iron-fortified cereals, enriched rice, eggs, beans, pumpkin seeds, spinach, tofu
- Enhance your absorption of iron:
  - Eat heme and non-heme sources together
  - Pair iron-rich foods with foods high in vitamin C (citrus, peppers, tomatoes)
- Avoid blocked absorption:
  - Avoid drinking coffee and tea at meals containing high-iron foods
  - Space out intake of dairy foods and leafy green vegetables from iron-rich foods
- Cook in a cast-iron skillet to increase iron in foods
- Consider iron supplementation only after consulting with a dietitian or physician







# Training programs for swimming

Aquatic sports present a distinct challenge in that water has a higher resistance than air. Training programs for swimmers focus not only on adaptation and enhancing energy systems, but also on stroke techniques that improve propulsion in water while minimizing drag.

**Body composition.** A high power-to-weight ratio can be advantageous in overcoming resistance and drag in the water. Ideal body composition for swimming varies within the sport and among individuals. Swimmers usually maintain a muscular stature and have long limbs and a large hand circumference. Male swimmers are typically leaner and more muscular than female swimmers, and sprinters commonly have a leaner build than distance swimmers.

**Nutrition needs.** Swimmers' caloric and macronutrient needs vary in relation to their training each day.

- Carbohydrates are the primary source of fuel during swimming, and protein provides the necessary substrates for muscle adaptation and gain.
- A swimmer's diet also should include a sufficient amount of key micronutrients such as iron, calcium and vitamin D, which are important to training as well as to immunity and skeletal health.
- Hydration is another nutritional factor that can impact a swimmer's performance. A poorly hydrated swimmer can suffer performance decrements and will be more susceptible to muscle cramping.

