

## POWER UP with PROTEIN

*By Rick Curl*

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Swimmers need protein for three important functions. Everyone knows that protein is the main ingredient of muscle tissue. But the enzymes that assist many important chemical reactions in the body, including the ones that produce energy during exercise, are also proteins. And did you know that protein itself can supply up to 15% of the energy used during long workouts?

While swimmers generally do get enough protein in their diet, many get it from the wrong sources and at the wrong times. Few swimmers recognize and take full advantage of the performance-boosting benefits of consuming protein both during and after workouts

### MONDAY THROUGH SUNDAY

The average adult needs about one gram of protein for every three pounds of body weight each day. Swimmers in moderate training should consume about one gram of protein for every two pounds of body weight. Swimmers in heavy training can consume up to one gram of protein per pound of body weight. For all swimmers, protein should account for approximately 15% of daily calories, while carbohydrate should account for 60% and fat the other 25. (Note that protein and carbohydrate yield four calories per gram, while fat yields nine.)

Swimmers should try to get a lot of their protein from plant foods like beans and nuts. Although rich in proteins, some animal foods like hamburger and eggs also are often high in saturated fat and cholesterol, which contribute to health problems including overweight and high blood pressure.

Also, they should avoid consuming too much protein. The body cannot make use of more than about one gram of protein per pound of bodyweight per day. Any extra protein will be converted to fat and stored. Eating too much protein also causes dehydration and loss of calcium from the bones.

### SWIM HARDER, SWIM LONGER

Lately protein has earned a much bigger reputation for improving exercise performance. It is already well known that athletes can improve performance by taking in fluids (including electrolytes) and carbohydrate during exercise.

Fluid replenishment can improve temperature regulation and reduce cardiovascular stress. Carbohydrate supplementation delays the onset of fatigue and improves endurance performance. This is why for many years most sports drinks have been formulated to contain electrolytes (including sodium and potassium) and 6-8% carbohydrate.

However, research is now showing that protein can provide additional benefits when added to a carbohydrate/electrolyte sports drink. Today there is strong evidence that protein, in the proper ratio with carbohydrate, should be considered an essential ingredient in an effective sports drink.

Consuming carbohydrate during exercise delays fatigue by increasing the amount of energy that is supplied by blood glucose, thereby slowing the rate of muscle glycogen depletion, which is the primary cause of fatigue in long swim workouts. The hormone insulin is responsible for transporting carbohydrate from the blood into the muscle cell where it can be used for energy. Insulin is released by the pancreas automatically in response to increasing glucose levels in the blood.

When a small amount of protein is consumed with carbohydrate, there is a stronger insulin response and glucose is delivered to the working muscles more quickly. The result is even greater muscle glycogen conservation and endurance than when carbohydrate is taken without protein. In one study, a sports drink containing carbohydrate and protein in a ratio of 4-1 increased endurance by 24% as compared to a conventional, carbohydrate-only sports drink and by 57% as compared to water

In extended workouts and races, protein consumption can also delay fatigue by serving as a direct energy source. After 80 minutes of fairly high-intensity exercise, protein contributes as much as 15% of the muscles' energy supply. If no protein is taken in during the workout, this energy comes from the breakdown of muscle protein, which can cause

muscle damage and soreness. Taking protein in your sports drink during exercise reduces the breakdown of muscle protein and helps speed muscle recovery.

What's more, studies have shown that branched-chain amino acids can help reduce fatigue of the central nervous system during prolonged exercise. Whey protein is a particularly good source of branched-chain amino acids. But be aware that too much protein will slow stomach emptying. The ideal ratio is four grams of carbohydrate to one of protein. This ratio provides the benefits of protein with no negative effect on stomach emptying.

### RECOVER FASTER

Following exercise, protein plays a powerful role in rebuilding and refuelling muscle cells, especially when combined with carbohydrate. As a general rule, within the first hour after a workout, an athlete should consume about one gram of protein for every eight pounds of body weight (0.125g per pound). In addition, about four grams of carbohydrate for every one gram of protein should be consumed.

It's now known that consuming carbohydrate and protein together within an hour of completing exercise results in faster muscle glycogen synthesis and faster muscle protein rebuilding than when carbohydrate is taken alone, or when both are taken more than an hour after exercise. In one study, a carbohydrate-protein recovery drink decreased post-exercise damage, increased post-exercise muscle glycogen synthesis, and extended next-workout endurance more than a sports drink containing carbohydrate and no protein.

### PROTEIN GUIDELINES

Protein, particularly when consumed in the proper ration with carbohydrate, can give swimmers a competitive edge. Here are some simple protein guidelines that we used at the Curl Burke Swim Club to help our swimmers improve workout performance and speed post-exercise recovery.

**Every day:** Protein should represent 15% of total calories

**During exercise:** 10-20 grams of protein per hour in combination with 40-80g of carbohydrate

**After exercise (Within one hour)** .5 gram of carbohydrate plus .125 gram of protein per pound body weight