Post Exercise Carbohydrates May Be Counter-Productive

At this time the consensus in the literature is that the use of a balanced amino acid mixture along with glucose or high glycemic carbohydrates taken immediately after exercise and then again a short time later would seem to optimize the immediate anabolic effects of exercise.[1]

There's no doubt that the use of the individual and combinations of amino acids both before, during and after exercise has significant short term effects on protein synthesis and the exercise and post exercise hormonal milieu. However, very little research has been done on the long term benefits or drawbacks on body composition and performance of using post exercise carbohydrate intake.

However, a recent study assessed the need for co-ingestion of carbohydrate with protein on post-exercise muscle protein synthesis.[2] The results of the study showed that the use of a protein hydrolysate alone was enough to increase protein synthesis after exercise and that the addition of carbohydrates did not further increase protein synthesis.

Not only is the use of post exercise carbohydrates non contributory to the increase in protein synthesis brought about by protein intake after exercise, it can actually be counter productive.

There is no doubt that the timing protein nutrition after exercise is crucial for increasing skeletal muscle protein synthesis and an overall net balance.[3] Exercise provides an adaptive response so that the body is able to make use of any nutrition supplied post exercise.

Nutrient intake on its own provides a storage response so that if one is fed or receives an infusion of mixed amino acids after a fasted period, protein synthesis increases, whereas protein breakdown remains the same or decreases slightly, which is different from the response after exercise.

Without nutrient intake after exercise protein synthesis and protein breakdown are increased but net balance does not become positive as it does after amino acid intake after fasting. Because of the exercise stimulus, when amino acids are provided after exercise protein synthesis increases more than that after exercise or AA feeding alone, and protein breakdown remains similar to exercise without feeding. Thus the provision of AA enhances protein synthesis and leads to a positive net protein balance and an overall increase in protein accretion.[4]

In addition, while the increase in protein synthesis after feeding is a transient storage phenomenon, physical exercise stimulates a longer-term adaptive response. Providing nutrition after physical activity takes advantage of the anabolic signaling pathways that physical activity has initiated by providing amino acid building blocks and energy for protein synthesis.

Glycogen compensation and super compensation (after glycogen depleting exercise) after exercise requires a substantial carbohydrate load that results in a quick and large increase in glycogen levels in both liver and skeletal muscles. Once the stores are full, or even super full, the stimulus declines dramatically. However, if no carbohydrates are given post exercise the muscle will maintain a capacity to full compensate or supercompensate glycogen until enough carbs are either available through the diet or by gluconeogenesis to fill the glycogen stores as much as possible.[5]

Because of the over emphasis placed on maintaining glycogen stores to maximize exercise performance, much of the research has centered around the effects of post exercise carbs, and post exercise carbs combined with protein,[6] and the effects these have on glucose transportes (GLUT1, GLUT2, GLUT4), glucose metabolism, including levels of hexokinase and glycogen synthase, and insulin,[7,8] there's not much out there dealing with just the use of protein and fat after exercise.

The usual advice is that carbs, with some protein thrown in, are a necessary part of post exercise nutrition regardless of diet that you're following, including a low carb diet.[9,10] However, that's not true. In fact the use of carbs post training can be counter productive and eliminating post training carbs can have added anabolic and fat burning effects.

That's because the intake of carbs after exercise blunts the post exercise insulin sensitivity. That means that once muscle has loaded up on glycogen, which it does pretty quickly on carbs, insulin sensitivity decreases dramatically.

As you know this statement runs counter to present thinking and research about post exercise nutrition although we've mentioned that one recent study showing that carbohydrate intake after exercise is non contributory to the increase in protein synthesis brought about by the use of a protein hydrolysate post exercise.

However, the study did not go as far as to state that the use of carbohydrates can actually be counter productive. As such, let's take it step by step so that I can make my reasons for the above statements clear and easier to understand.

First of all it's well known that a single session of exercise increases insulin sensitivity for hours and even days.[11,12]

It's also known that a bout of resistance exercise results in a significant decrease in glycogen and that total energy content and CHO content are important in the resynthesis of muscle and liver glycogen.[13]

Glucose uptake and glycogen synthesis are enhanced in the presence of insulin following an acute exercise bout that lowers the muscle glycogen concentration and activates glycogen synthase.[14,15]

Muscle glycogen concentration dictates much of this acute increase in insulin sensitivity after exercise.[16] Therefore, an increased availability of dietary carbohydrate in the hours after exercise and the resultant increase in muscle glycogen resynthesis reverses the exercise-induced increase in insulin sensitivity.[17]

Along with glucose uptake, amino acid uptake and protein synthesis also increase. As well, the use of fatty acids as a primary fuel also rises after exercise since glycogen resynthesis takes priority to the use of glucose for aerobic energy.

However, as liver and muscle glycogen levels get replenished, insulin sensitivity decreases, as does amino acid uptake, protein synthesis and the use of fatty acids as a primary fuel.

By increasing insulin levels and not providing carbs you shunt your body's metabolism to the use of more fatty acids for energy while at the same time keeping muscle glycogen levels below saturation and amino acid influx and protein synthesis elevated for a prolonged period of time post exercise.

This increased capacity for glycogen synthesis, and everything that goes with it, can persist for several days if the muscle glycogen concentration is maintained below normal levels by carbohydrate restriction. By keeping carbs low and protein and energy high after training, you can increase protein synthesis over a prolonged period of time and get long term anabolic effect.[18]

As well, the type of protein used post exercise can have an effect on glycogen levels and thus the anabolic stimulus. For example it's been shown that a fast protein, such as whey protein, leads to increased glycogen levels over slow proteins such as casein.[19]

In the long run, the optimal protein for increasing protein synthesis, decreasing catabolism and increasing muscle accretion is a blend of slow and fast proteins, plus the addition of a few other useful ingredients.

MD MRP LoCarb

MRP LoCarb – Optimal Post Training Nutrition

I formulated MRP LoCarb to provide optimal post training nutrition, especially for those low carb diets as it dramatically increases protein synthesis, and replenishes all of the muscle cell energy sources including glycogen (partly through the gluconeogenic process) and the important intramuscular triglycerides pool, while at the same time limiting fat formation and storage and increasing recovery.

The special blend of proteins in MRP LoCarb, similar to the one that's in the Myosin Protein blend, maximizes protein synthesis and minimize protein breakdown for several hours, thus making efficient use of the increased protein synthesis that occurs for as much as one to two days after training.

Since the presence of fat combined with protein and limited carbs does not decrease the insulin response or the absorption of amino acids and protein as it does with those who are carb adapted, MRP LoCarb is the perfect post workout meal supplement for those who are fat adapted and are on a lower carb diet.

As we've discussed, the problem with taking in a lot of carbs post training is that it dramatically increases insulin secretion. As well, it also decreases GH secretion and IGF-I expression. On the other hand using protein and amino acids, and other compounds (such as alpha lipoic acid) to increase insulin sensitivity doesn't decrease GH and IGF-I levels, which then remain elevated adding to the post training anabolic effects. As well, the increase in fat breakdown and oxidation that normally occurs after exercise is also prolonged. The end result is a long term anabolic, fat burning effect that enhances training results.

Interestingly, keeping the carbs low after training, and taking in more protein along with some fat has a dual partitioning effect on fat in the body. First of all body fat is broken down and used as fuel preferentially to amino acids and glycogen. As well, there is an increase in intramuscular triacylglycerol levels, which are fat droplets in muscle cells and provide energy to working muscles in ways that are similar to muscle glycogen.

At the same time there is also a gradual increase in glycogen levels, both hepatic and muscular, first of all through the small amounts of carbs that are part of the MRP LoCarb, and more importantly through the gluconeogenic process in which the body forms only the carbs it needs by making glucose mainly from fats (the glycerol portion) and protein (various glucogenic amino acids).

The slow increase in glycogen levels initiated by MRP LoCarb as we've discussed, serves to keep insulin sensitivity high for several hours resulting long term increases in amino acid transport and protein synthesis, and subsequent muscle accretion.

On the other hand, because of its sophisticated blend of ingredients, MRP LoCarb can also be used for those on higher carb diets. Using MRP LoCarb as the base, they can mix it in milk and/or add fruit, honey, ice cream, or other sources of carbs.

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