

What is the potential effect of a protein supplement on improving exercise performance, increasing muscle glycogen levels and enhancing post-exercise muscle recovery?

Protein has been shown to have potentially important effects relating to exercise performance.

Recent studies have investigated whether the ingestion of a particular form of protein called a protein hydrolysate (aka protein peptide) during exercise results in improved endurance exercise time to exhaustion or time trial performance, or improved recovery if ingested after exercise.

MUSCLE GLYCOGEN STORES

One of the goals in sports nutrition is to achieve a rapid repletion of muscle glycogen stores after prolonged training. It is well established that when the muscle glycogen stores become low, training becomes difficult and performance in races is sub-optimal. Thus a high carbohydrate diet has been recommended. Initially, findings suggested that the addition of protein, and especially protein hydrolysate, may increase the rate of muscle glycogen formation. This was attributed to the rapid absorption of the protein hydrolysate resulting in high insulin concentrations in the blood, which in turn causes an increased rate of glucose uptake into the muscle and subsequent more rapid formation of muscle glycogen. However, subsequent studies have shown that ingesting the same energy content in the form of additional carbohydrate, has the same effect.

MUSCLE GROWTH AND REPAIR

A number of studies have shown that one of the amino acids, leucine, is effective at stimulating new protein formation i.e.

muscle growth and repair. In addition, leucine has also been shown to inhibit protein breakdown. Thus, not only is leucine important in switching on the pathway leading to formation of new protein, but it also slows breakdown of existing protein.

However, the proteins making up muscle, like other proteins, consist of a vast number of amino acids all linked together in a specific way to form 'muscle'. Thus, while leucine may switch on the muscle protein manufacturing process in the body, to be effective at repairing existing muscle protein or synthesizing new protein, the other amino acids involved in building or repair of muscle must also be present. This is where the new protein, hydrolysates, become potentially key role players, as they contain leucine in fairly large quantity, as well as all the other amino acids which are needed to manufacture new protein (muscle). In our research with protein hydrolysate, we have also seen a 'switching on' of the pathway leading to muscle formation. We were able to show this with the ingestion of only 0.2g/kg of a protein hydrolysate immediately after exercise (although this was repeated over a period of a number of hours).

REDUCING CORTISOL

Cortisol is a hormone in the body which has many important functions and which increases in concentration during hard exercise. However, prolonged high concentrations are not desirable as this may cause a breakdown of muscle tissue. Ingestion of carbohydrates during prolonged exercise has been shown to help reduce the increase in cortisol, while ingestion of carbohydrate on completion of training has been shown to bring the concentration down more quickly than if no carbohydrate is ingested.



Ingestion of a protein hydrolysate and carbohydrate during or immediately after exercise may have a three-fold effect: enhancing the rate of muscle glycogen resynthesis, improving muscle repair (protein synthesis), and reducing cortisol. Although research evidence to make definitive claims is still lacking, the existing research findings are strongly suggestive of a beneficial effect from ingestion of a protein hydrolysate together with carbohydrate during or immediately after training.

SUMMARY AND RECOMMENDATIONS

As an exercise physiologist, I remain cautious about over-interpreting the research findings, but as a consultant to athletes I advise that there is sufficient research evidence to suggest that using a protein hydrolysate/carbohydrate mixture could improve recovery. In this regard, anecdotal evidence from athletes has been very positive. For anyone wishing to try this themselves, the mixture I recommend consists of 0.2g/kg body weight of protein hydrolysate and 0.8g/kg of carbohydrate, ingested within the first 30 minutes after training.

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