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Nutrition and Nutritional Recovery

This article looks at a sometimes misunderstood or at worst ignored part of training and that is nutrition. Not putting the correct fuel into the body, and more importantly at the right time, can diminish performance, recovery from training and competition and subsequently see a drop in standards so it stands to reason that the right guidance should be given to our athletes.

The article and advice contained here assumes that the athlete has no medical issues and has no intolerances, for those that may have diabetes or severe allergies or special dietary needs either medical or professional nutritional support should be sought. Much of the information contained was produced from notes taken at the International Sports Science and Sports Medicine Conference.

Recover before you start!

It may seem rather curious however it does stand to reason that recovery strategies should be implemented not just after exercise but attention should be paid to nutrition prior to exercise, such strategies include the provision of additional macronutrients (i.e. protein), individual amino acids (i.e. leucine and glutamine), and micronutrients particularly antioxidants as well as fish oils.

Before training / competition – For all events carbohydrates are appropriate fuel prior to training or competition with a recommended intake of 0.8g/kg body mass low glycaemic and 0.4g/kg body mass high glycaemic. For athletes who are competing on the track and may have to take part in heats and finals on the same day and where a short turnaround of possibly just a couple of hours is required, fructose is best as this is quickly absorbed into the body. Following hard competition or exercise it will then take approximately 42 hours of a high carbohydrate diet to get back to normal glycogen levels in the body.

Post exercise/competition recovery. An early intake of protein is required as soon after exercise or competition as possible and should become an ingrained part of the recovery process as it is known to promote muscle adaptation during recovery from exercise in several ways:

- Aiding in the repair of exercise-induced damage to muscle fibres.
- Promoting training-induced adaptations in muscle fibres (e.g., synthesis of new proteins that are involved in energy production and/or force generation).
- Facilitating the replenishment of depleted energy stores.

The recommended amounts post exercise are 20g for recovery for a 70Kg athlete (i.e. 0.3/kg body mass) – and about 15 g for a 45Kg female athlete. It is important to remember that our muscles act in a similar fashion to a sponge for up to the first hour after exercise so whatever goes into your body during this period is crucial. If you eat a high fat burger and a beer that will have become your muscle recovery strategy!

What is the optimal intake of protein on an on-going basis?

Most people eat only about 10% to 15% of total protein in the morning, about 20% or so in the afternoon, and the remainder at dinner. Since our bodies cannot store protein, spreading that intake more evenly throughout the day would be beneficial. It has been established therefore that, for example, 20g of protein 4 times a day, 4 hours apart is optimal for a 45 Kg female athlete.

Rehydration. Though water is obviously the first call when rehydrating it would be prudent to use drinks containing 50-100mmol of sodium content as these rehydrate better than other products with lower sodium content. Dioralyte or something similar (a product to rehydrate post diarrhoea) is perfect.

Also Cherry Active is good to use for recovery purposes due to the high levels of antioxidants contained helping repair damage as radicals cause damage, causing loss of force from which it can take 28 days to fully recover – NAC (Ibuprofen) will help if taken in first 24 hours. It is good advice to not use antioxidants in training so as to allow the body to adapt but to do so during competition periods.

Vitamin D

Vitamin D is absolutely necessary for circulation and you can generally only get 20% of your daily requirement from your dietary intake. Vitamin D₃ affects contractile (a sub-cellular structure (organelle) involved in osmoregulation) efficiency which will affect bones and kidneys. It would be a good idea to take a Vitamin D supplement before exercise to prevent severe muscle damage.

Nutritional Support of Muscle Adaptations to Exercise

Now let's review and examine the evidence of the dose/protein type/different amino acids, and the role of carbohydrates in stimulating muscle protein synthesis and hypertrophy which is the increase in the volume of an organ or tissue due to the enlargement of its component [cells](#). It is distinguished from [hyperplasia](#), in which the cells remain approximately the same size but increase in number.

The recommendation is made by sports scientists is to consume 0.3g/Kg bodyweight per meal of protein i.e. 20g x 4 meals per day as this would maximally stimulate muscle protein synthesis. However it is suggested that the pre-bedtime meal could be as much as 0.6g/Kg which allows for a longer period of regeneration of tissue and so 1.8g/Kg/day of protein in total is advocated. In such case for a 50Kg athlete this would actually look like 4 x 15g protein at each meal + 1 x 30g protein at bedtime = 90g protein per day.

Milk of course is a great source of protein (500ml = 18g of protein). Cow's milk is better than Soya products because it has more leucine for long term lean muscle development. In milk it is the 'whey' that elicits rapid aminoacidemia (an excess of amino acids in the blood.) whereas Casein is slower (Casein is a protein commonly found in mammalian milk, making up 80% of the proteins in cow's milk and between 20% and 45% of the proteins in human milk. It might be worth considering that as exercise sensitises the muscle for up to 48 hours –perhaps after exercise if you wake up in the night it might be good to have a protein shake handy!

Recovery strategies

Nutritional preparation for training is essential of course, however serious consideration should be made for recovery especially for those training on a regular basis or who have races close together perhaps as heats and finals on the track.

Cherries and Berries have great health giving properties as well as aiding our athletes. High consumers of fruits and berries have lower blood pressure and have a lower incidence of stroke so the benefits are obviously wider than just for recovery. Berries and fruit have lots of polyphenols such as flavonoids, for example grapes, which possess antioxidant but importantly in this case to aid recovery anti-inflammatory properties. Cherries and in particular sour, or Montmorency cherries, have very high anthocyanin's which

is a very large group of red-blue plant pigments. These occur in all higher plants, mostly in flowers and fruits but also in leaves, stems, and roots. Although a great anti-inflammatory, one kilogram of blackberry for example contains approximately 1.15 gram of Anthocyanins, and red and black legumes can contain 20 mg per gram so the quantities needed to produce a high level of intake are indeed very large and a more convenient way of ingesting these will be needed. The colour of anthocyanins depends on the structure, but also on the acidity of the fruit. Many are red at acidic conditions and turn blue in less acid conditions. The highest content of anthocyanin's are found in blackcurrants and all these will enhance the acute recovery of muscle function most likely through reduced oxidative damage and inflammation – so after a session like 10 x 400m reps drinking 2 x 30ml of Cherry Active or a similar drink will enhance repair to muscles. Cherry Active type drinks also contains melatonin and therefore also helps sleep. The most useful occasions to use Cherry Active types supplements are:-

- a) in the early stages of intensified training
- b) when involved in a tournament or several rounds
- c) as part of injury recovery

The recommendation is that 3 days of loading is best with an optimum dose of 300mg of polyphenols.

Some good news for those with a sweet tooth, Epicatechin is an antioxidant which enhances fatigue resistance and occurs in dark chocolate with 200g a day being shown to have a good effect. It is wise to consider the fat content of this which must be balanced against the benefits.

Milk

Milk is an excellent recovery product containing carbohydrates, protein, calcium, sodium, potassium and vitamins. It is good to use as a recovery drink after exercise as it helps with muscle repair/adaptation/glycogen re-synthesis/exercise capacity and rehydration and is excellent for bone health. The addition of chocolate as a shake will increase the carbohydrate levels and the suggested amount is 500ml within 1 hour of exercise, as ever though if using this as a recovery between rounds or heats it would be wise to practice first to minimise stomach troubles in the later race.

Beetroot

So to the new "on trend" supplement which has been heralded as the instant key to a PB. Taking a beetroot shot won't of course immediately bring down your best times however it has been shown to be useful fuel in certain circumstances as it has been shown that with other nitrate supplementation it considerably enhances exercise tolerance in moderate hypoxia. It would be in such case an extremely good supplement in hypoxic conditions when there is depletion of phosphocreatine and glycogen– e.g. at high altitude or when O₂ delivery is impaired. As with many supplements it is best to ingest in a concentrated form but as ever try it before using on a regular basis to see what effect it might have on your digestive system.

Barry Fudge (head of UKA endurance) has in the past recommended taking beetroot shots an hour before exercise for the 7 days up to and including the morning of a race and does **not** advocate continual supplementation. However research suggests using 2 shots of Beetroot for 3 days loading before a race, it should also be taken approximately 2 hours before exercise as effectiveness peaks at around 2 ½ hours.

The above of course is, I am sure, just barely touching the surface of the huge amounts of research that goes on regarding nutrition; however the key thing to remember is that nutrition and a well-planned training regime support each other and a good nutrition plan or fad cannot compensate for incorrect or insufficient training. Remember also that from a coaching point of view we may only be with or see our athletes for a few hours a week so as with training the athlete should be planned with a basic nutritional programme especially centred around preparation for and recovery from exercise.

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