Boosting Immune Function in Athletes

Where should you spend your time and money?

Athletes undertaking regular strenuous exercise walk a knife-edge between extreme physical well-being and impaired immune function. Research indicates that athletes are at increased risk of upper respiratory tract infection during periods of heavy exercise and for 1-2 weeks following race events (Nieman 1990). The cause of this increased risk is most likely due to the immunosuppressive actions of stress hormones such as adrenaline and cortisol (Gleeson et al. 2004).

Given this, what strategies can athletes undertake to minimise their risk of ill health while training and competing?

Firstly, it is important to realise that immune function suppression in athletes is multi-factorial – a fact that many athletes overlook. David Nieman, a world leading researcher of immune function in athletes states that “It makes sense that Upper Respiratory Tract Infection risk may be increased when the endurance athlete goes through repeated cycles of unusually heavy exertion, has been exposed to novel pathogens, and experienced other stressors to the immune system including lack of sleep, severe mental stress, malnutrition, or weight loss” (Nieman 2003). Athletes often neglect many of these factors following exercise and focus their attention on the well-publicised virtues of nutritional supplements that claim to boost immune function.

To maximise recovery and minimise risk of infection following exercise, several factors need careful consideration. These include:

- Managing physical training loads and daily physical activity associated with work and other routine activities
- Managing psychological stress including stress associated with work, family, training and competition
- Incorporating sufficient rest
- Minimising exposure to germs and bugs by practicing good hygiene
- Ensuring adequate sleep and
- Maintaining or for some introducing a diet providing adequate fuel for training and recovery, and a good mix of nutrients and other food compounds.

Adapted from Pyne et al. (2000)

In a study investigating the use of sports foods and dietary supplements in 77 elite Australian swimmers, researchers found that 99% of athletes reported using these products, with the most popular dietary supplements used being vitamin and mineral supplements (94% of the group) and herbal preparations (64% of the group) (Baylis et al. 2001). Despite the heavy reliance by athletes on nutritional supplements, currently there is a lack of evidence to support high doses of anti-oxidant vitamins, glutamine supplementation or echinacea extracts in preventing exercise-induced immune suppression and protection from infection (Gleeson et al. 2004).

An adequate dietary intake of protein and specific micronutrients including vitamins A, C, E, B6 and B12 along with iron, zinc, copper and selenium are all critical factors for the maintenance of optimum immune function. The “million dollar” question for athletes is whether or not supplemental forms or megadoses of these nutrients are beneficial.
There is a growing list of research papers that report indifferent results on the effects of nutritional supplements on the acute immune response to exercise. Antioxidants (i.e. vitamins C and E) and glutamine have received considerable attention, but the data thus far does not support their role in negating immune function changes after heavy exercise (Gleeson et al. 2004).

Current opinion is that athletes should invest in nutrient-rich foods and fluids that provide sufficient energy and a wide range of vitamins, minerals and other important chemicals, such as phytochemicals, found naturally in foods. Furthermore, forward planning and an organised daily food intake are necessary to ensure appropriate foods are consumed in order to meet the nutrition goals for training and competition. In real life, many athletes fail to spend the necessary time and effort to eat cleverly over the day to promote an optimal workout and recovery.

Suggestions for including a wide range of nutrients are:

- Include cereal foods such as wholemeal, multi-grain or seeded breads, fibre-rich cereals, brown rice or wholemeal pasta.
- Select a wide variety of fruit and vegetables during the day. Fresh fruit makes an excellent snack choice between training sessions – it’s portable, tasty and rich in nutrients. Add a variety of different coloured vegetables to meals – the more colour the better.
- Include different salad options in lunch time sandwiches. It’s easy to fall into the trap of having plain sandwich fillings at lunch – particularly if numerous work, study and training commitments exist. Make an extra effort to ensure you have a nutrient packed sandwich filling at lunch.
- Plan ahead for the coming day so you don’t have to rely on take-away meal choices and snacks. Making lunch the evening before and packing a variety of snacks in your training bag will help make sure there are nutritious snacks available for exercise.
- Despite the numerous claims of fad diets, the bottom line is that they are usually effective in the short-term as they restrict food variety. Athletes aiming to reduce body weight or manipulate body composition should aim to include as wide a variety of foods as possible.

Recent research suggests that a sufficient carbohydrate intake in the days preceding strenuous exercise acts as an effective countermeasure to the suppression in immune function that occurs following exercise. In a recent review, Michael Gleeson and colleagues (2004) state that “an athlete exercising in a carbohydrate-depleted state experiences larger increases in circulating stress hormones” than the athlete who is well-fuelled for exercise. They go on to say that “consuming carbohydrate during exercise attenuates rises in stress hormones” and “appears to limit the degree of exercise-induced immunosuppression”. Recently a team of researchers from Birmingham and Loughborough Universities demonstrated that consuming 30-60 g of carbohydrate per hour during 2½ hours of strenuous cycling prevented a decrease in markers critical to anti-viral defence (Lancaster et al. 2003).

Although further research is warranted in this area, matching carbohydrate intake with daily fuel needs may protect immune function following prolonged strenuous exercise.

Strategies to avoid carbohydrate depletion during exercise are:

- Have a carbohydrate-based snack such as a Powerbar Performance Bar before you start high intensity training, particularly hard morning training. If you are unable to tolerate something before you start exercise, have a source of carbohydrate during
the session such as a sports drink or a carbohydrate gel (e.g. Powerbar Powergel).

- Have a carbohydrate-based snack shortly after training to start the recovery process. This is of particular importance for athletes training more than once a day with limited time to recover for the next session. The amount of carbohydrate required following exercise is determined by the intensity and duration of the exercise undertaken and the timing of your next meal.

- Base meals around nutrient-rich carbohydrate-containing foods and fluids. Rice, pasta, bread, cereals, fruit, starchy vegetables and low-fat milk and yoghurt are nutrient-packed carbohydrate-containing choices. The quantity needed is dependent on daily activity levels, the nature of the activity undertaken and the athlete’s body size. The aim is to match daily carbohydrate needs with an appropriate amount of carbohydrate-containing foods and fluids throughout the day.

- Time the intake of carbohydrate-containing foods around training sessions to better assist performance during exercise and facilitate recovery following exercise. It is easy for athletes to fall into bad habits with regards to timing their food intake around training. For many athletes there are numerous commitments they need to attend to throughout the day which distracts them from their exercise related nutrition goals. In many cases athletes eat little throughout the day, mainly due to lack of time and access, while eating much of their food intake during the later part of the day. Athletes need to be prepared to have suitable, nutritious food and fluid choices available around exercise to assist exercise performance and recovery from exercise.

References:


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