

THE USE OF PROBIOTICS IN ATHLETES

POST EXERCISE IMMUNE SUPPRESSION

Incidences of upper respiratory-tract infections (URTIs) and gastrointestinal (GI) illness, particularly diarrhoea, are well known to increase during heavy training and competitions^{1,2}. Athletes undertaking prolonged intense exercise may be more susceptible to illness from exercise-induced immunosuppression. In particular, salivary IgA and IgM concentrations, our first line of mucosal defence, have been observed to decline immediately after a bout of intense exercise and usually recover within 24 hours³. The degree of suppression is associated with the intensity of the exercise and the duration or volume of the training³. Changes in antimicrobial proteins and granulocyte activity have also been observed⁵. These alterations in immune markers are proposed to provide a window of opportunity for micro-organisms to establish infection¹. Furthermore, intensive exercise is reported to increase small intestine permeability through several mechanisms which could include reduced blood flow and hyperthermia in the gut⁴. In addition to its role in digestion and food tolerance, a compromised barrier function may produce an inflammatory response and initiate a cytokine cascade that could contribute to GI distress during and after exercise⁴.

EXERCISE AS A STRESSOR

Intensive exercise can have a big impact on the levels of stress exerted on the body. As too can the worry or anxiety of a big race. Exercise-induced changes in immunity are similar to those changes associated with other forms of stress⁵. The GI tract is home to trillions of microbes that line the gut wall and play an essential role in supporting strong immune and digestive systems. It is well known that stress can influence the balance of good to bad bacteria in the gut by reducing the number of beneficial strains of lactobacilli and bifidobacteria, which in turn allows an increase of pathogens⁶.

HOW PROBIOTICS COULD HELP

Probiotics defined as 'live microorganisms which when administered in adequate amounts confer a health benefit on the host'⁷, could be valuable in such circumstances. They have been shown to replenish depleted beneficial gut microflora, help support a healthy gut lining and regulate immunity. The mechanisms of actions are thought to be the reduction of luminal pH, competition with pathogens for adhesion sites and nutritional sources, secretion of antimicrobial substances, toxin inactivation, and immune stimulation⁸.



The following table highlights some recent studies describing the use of probiotics in athletes:

Author	Probiotic	Study methods
Haywood <i>et al.</i> , 2014 ⁹	<i>Lactobacillus gasseri</i> , <i>Bifidobacterium bifidum</i> & <i>B. longum</i> at 2.7 billion CFU for 4 weeks	Significantly reduced incidence of URTIs and fewer days of illness in 30 elite rugby union players
Lamprecht <i>et al.</i> , 2012 ¹⁰	<i>B. bifidum</i> , <i>B. lactis</i> , <i>Enterococcus faecium</i> , <i>L. acidophilus</i> , <i>L. brevis</i> & <i>Lactococcus lactis</i> at 1 billion CFU for 14 weeks	In 23 trained men (triathletes, runners, cyclists) probiotics decreased zonulin in faeces marker indicating enhanced gut permeability), lowered TNF- α and exercise induced protein oxidation.
Gleeson <i>et al.</i> , 2011 ¹¹	<i>Lactobacillus casei</i> taken for 4 months	Reduced the frequency of URTI during winter training in 84 highly active individuals, which may be related to better maintenance of saliva IgA levels .
West <i>et al.</i> , 2011 ¹	<i>Lactobacillus fermentum</i> at 1 billion CFU for 11 weeks	In 99 competitive cyclists <i>Lactobacillus</i> numbers increased, severity of GI illness were substantially reduced , which became more pronounced as training load increased and immune markers were less affected .
Cox <i>et al.</i> , 2010 ¹²	<i>Lactobacillus fermentum</i> at 12.6 billion CFU for 4 months	During winter training in 20 healthy elite male distance runners less than half the number of days of respiratory symptoms , were experienced along with lower illness severity .

The health of the gut flora can also impact on how we are able to cope with levels of stress during training and competitions. Past studies have focused on the altered signalling from the brain to the gut via the nervous system, but more recent studies are investigating the impact of the guts' microbiota on brain function and our behaviour – the 'microbiome-gut-brain axis'. Clinical evidence is mounting to support the role of probiotic intervention to modulate the gut microflora, in reducing anxiety and stress responses as well as improving mood in those who suffer with IBS type symptoms¹³.

DIGESTIVE SUPPORT

Supporting healthy bacteria levels is important to optimise immune and digestive function in athletes. Beneficial bacteria can help to break down foods, aid absorption of nutrients and supplements and reduce uncomfortable symptoms of bloating that can affect sports performance. Efficient protein utilisation is important for those athletes increasing their daily protein intake and to ensure regular bowel movements. B vitamins are essential for energy production in every cell in the body. As water soluble

vitamins, they are only present in the body for a short time after consumption of certain foods. To ensure a constant supply of energy a healthy gut microflora supports B vitamin product to retain adequate levels and prevent fatigue¹⁴. Live bacteria can be found in traditional fermented foods (such as sauerkraut, tempeh, miso, kefir, kombucha etc) and live bio-yogurt or delivered in a standardised capsule form as a probiotic supplement. A diet high in simple sugars and refined carbohydrates are known to feed potentially harmful bacteria and yeast in the gut so should be avoided where possible or consumption kept to directly before, during or after training.

MULTI-STRAIN VS SINGLE STRAIN

As different probiotic strains have been shown to have slightly different beneficial effects, a multi-strain probiotic could be considered to exert a wider range of benefits to a wider range of people and conditions. A review by Chapman *et al*¹⁵ in 2011 showed that probiotic mixtures appear to be effective against a wider range of symptoms and conditions than single strain products.

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