

PERFORMANCE NUTRITION

DECIPHERING THE LATEST SCIENTIFIC RESEARCH TO HELP YOU GET THE MOST FROM YOUR TRAINING, DIET AND SUPPLEMENTATION

BY MARK HOBDEN AND JAMES COLLINS

SUPPORT YOUR GUT BACTERIA TO BOOST IMMUNE FUNCTION AND ENERGY METABOLISM

The human digestive system, specifically the large intestine, is home to a huge community of bacteria. Several species are harmful to the body, such as *Escherichia Coli* (E. Coli) and *Salmonella*, but other species, the so-called 'good' bacteria, such as *Bifidobacteria* and *Lactobaccilli*, have various health-promoting properties. Importantly, these bacteria are now known to influence physiological processes in the body through interactions with major organs, muscles and fat tissue. There is therefore considerable interest in the provision of dietary sources, such as probiotics (which contain a live culture of good bacteria) and prebiotics (a non-digestible energy source for good bacteria) to alter the balance of these bacterial populations.

A recent study by Prof Glenn Gibson and colleagues at Reading University found a specific type of galactooligosaccharide (prebiotic) mixture increased numbers of *Bifidobacteria* in the digestive system, and most notably, had a beneficial effect on biological markers of immune function and energy metabolism.

MAIN FINDINGS

- Prebiotic consumption increased the faecal counts of beneficial *Bifidobacteria*.

- The prebiotic mixture had a positive effect on faecal secretory IgA (immune marker), plasma C-reactive protein (marker of inflammation), plasma insulin (regulator of blood glucose) and blood cholesterol levels.

SIGNIFICANT METHODOLOGY

In this double-blind study, 45 overweight adults consumed a galactooligosaccharide mixture (Bi²muno) and a placebo for a series of 12-week treatments (each separated by four weeks). At the beginning, middle and end of each 12-week test period, whole blood, saliva, faeces and anthropometric measurements were taken.

TAKE-HOME MESSAGE

How bacteria from the gut interact with the human body is an exciting, but largely unexplored area of research. Nonetheless this study, among others, highlights the potential of dietary interventions to improve the balance of bacteria and beneficially impact on metabolic processes in the body. Not only may prebiotics support digestive health and comfort but they may also provide defence against infection, improve regulation of blood glucose



PHOTODISC

and reduce systemic low-grade inflammation.

Onions, asparagus, Jerusalem artichokes, leeks and bananas provide small amounts of naturally occurring indigestible starch, a known prebiotic. Furthermore, certain prebiotics are now being incorporated into some breakfast cereals. Supplements, such as the galactooligosaccharide mixture used in the present study, can now be purchased from various health stores. A daily dose of at least 5 grams appears to promote beneficial changes in the intestinal bacteria. Combining prebiotics with the intake of probiotic yogurts and yogurt-type drinks, may provide additional, synergistic benefits.

An increased intake of prebiotics/probiotics would be beneficial in the following situations:

- While undertaking intense training periods when immune function is often compromised.
- When travelling abroad in order to reduce the symptoms of travellers' diarrhoea.
- After taking a course of antibiotics, as this form of medication kills off a large proportion of intestinal bacteria.

REFERENCE

Vulevic J, Juric A, Tzortzis G, Gibson GR. (2013) **A Mixture of trans-Galactooligosaccharides Reduces Markers of Metabolic Syndrome and Modulates the Fecal Microbiota and Immune Function of Overweight Adults**, *The Journal of Nutrition* [Epub ahead of print]

DON'T FORGET ABOUT VITAMIN K—A KEY COMPONENT OF BONE HEALTH

Dietary calcium and vitamin D are well known major factors in the maintenance of bone health. However, they are not the only contributors to the skeleton, with the European Food Safety Authorities acknowledging that vitamin K is also key. Vitamin K is found naturally in two distinct forms: phylloquinone (vitamin K₁) and short-chain menaquinone-4 (vitamin K₂). Research by a group of scientists from the Netherlands has shown that the intake of either vitamin K₁ or vitamin K₂

can boost bone health in post-menopausal women, a population group particularly susceptible to compromised bone density. Their initial studies have established that the administration of a strong daily dose of either form of vitamin K reduces age-related declines in bone strength and density. In their latest study, published in *Osteoporosis International*, they investigated the effects of vitamin K₂ to determine whether a much lower dose could exert similar benefits in the prevention of bone loss in the same population group.

MAIN FINDINGS

- Vitamin K₂ supplementation improved vitamin K status and decreased age-related declines of bone mineral density and bone strength.
- The intake of vitamin K₂ also decreased bone losses in the lower thoracic region of the spine.

SIGNIFICANT METHODOLOGY

A total of 244 healthy post-menopausal women took part in the study. They each received either 180 micrograms of vitamin K₂ or a placebo capsule on a daily basis for three years. Select anatomical measurements were completed at baseline and after one, two and three years of treatment. These included bone mineral density, bone strength and fracture assessment measurements using a DXA body-imaging scanner. Furthermore, blood samples were collected and analysed for circulating uncarboxylated and carboxylated osteocalcin, which served as markers of vitamin K status.

TAKE-HOME MESSAGE

Although the present study was undertaken on post-menopausal women, the findings do provide valuable information concerning the role of vitamin K in bone health. Gym-goers can increasingly find themselves in a position of compromised bone health. One such example is long periods of reduced energy availability (during heavy training or weight loss). It is noted that female



PHOTODISC

endurance and aesthetic athletes are most susceptible, though this can also affect males in a chronic energy deficit.

Although vitamin K deficiency is extremely rare, gym-goers should ensure adequate dietary intake through the consumption of vegetables, especially green-leafed varieties, such as kale, spinach and broccoli for vitamin K₁, and animal-based products, such as poultry, eggs and various cheeses, for K₂. Vegans needn't worry though, as the human digestive system is home to various species of bacteria that convert vitamin K₁ into K₂. Vitamin K deficiency is only really an issue if the functioning of the large intestine is disturbed, either by disease or trauma, or if the intestinal bacterial community is compromised, such as following extended antibiotic treatment. **M&F**

REFERENCE

Knapen MH, Drummen NE, Smit E, Vermeer C, Theuwissen E. (2013) **Three-year low-dose menaquinone-7 supplementation helps decrease bone loss in healthy postmenopausal women**, *Osteoporosis international* [Epub ahead of print]

Performance Nutrition is a London-based consultancy that supports elite and recreational athletes. Director James J Collins is a sport and exercise nutritionist and head nutritionist for Arsenal FC. For more information visit www.theperformancenutritionist.com

Mark Hobden is completing a doctorate in nutrition at the University of Reading and has degrees in sports biology and sport and exercise nutrition. He has also worked for the Gatorade Sports Science Institute, the Porsche human performance team at Silverstone and in professional rugby.