

## NUTRITION FOR ENDURANCE TRAINING

Exercising, particularly endurance activity (i.e. cycling, hiking, running, swimming, cross-country skiing etc.) is associated with depression of the immune system. This is evidenced through athletes participating in endurance events suffering increased rates of infection, with upper respiratory tract infections (i.e. colds, sore throat, etc) particularly common (1,2).

To minimise immunosuppression and associated increased risk of illness, nutritional strategies can be considered alongside periodisation of training to optimise recovery. It is vital that energy intake is matched to energy expenditure. The syndrome of relative energy deficiency in sport (RED-S) refers to a collection of symptoms caused by insufficient energy to fuel training and daily physical activity. The body prioritises movement at the cost of impaired physiological function including depression of the immune system, as well as other fundamental biological processes including menstrual function, metabolic rate, protein synthesis and cardiovascular health (3).

In addition to ensuring macronutrient (carbohydrate, fat, protein) requirements are met, there are some key micronutrients (listed below) associated with supporting the immune system which are at risk of depletion when endurance training. Ensuring you include a variety of these nutrient rich foods in your diet will support your health during your training.

- **Zinc (Zn):** Zn is an important mineral for immune function and is involved in a myriad of other functions including wound healing (4).  
SOURCES OF ZN: Meat, shellfish, legumes, beans, nuts, seeds, dairy, whole grains.
- **Magnesium:** When deficient in Mg there is an increase requirement for oxygen to continue exercising, therefore reducing your performance (5).  
SOURCES OF MG: Spinach, whole grains, nuts, dark chocolate, avocado.
- **Iron (Fe):** Fe deficiency is particularly prevalent in female endurance athletes (1) due to an increased bodily demand. Fe deficiency impairs muscle function and limits training capacity (3). It is particularly important Fe levels are replete before participating in events at altitude to enable beneficial haematological adaptations (3).  
SOURCES OF FE: The most easily absorbed sources of iron are from animal sources i.e. red meat, poultry, fish and eggs. However, Iron is also found in many plant-based foods i.e. green leafy vegetables, tofu/tempeh, nuts and seeds. Consume vitamin C rich foods along with plant-based sources (i.e. chopped tomatoes with lentils) to increase the absorption of iron.
- **Vitamin D:** Vitamin D is necessary for bone health and maintenance of muscle structural integrity and function (6).



**SOURCES OF VIT D:** Whilst there are some dietary sources of Vit D (mushrooms, fatty fish, egg yolk, fortified products), Vitamin D is primarily obtained from UV radiation from the sun. When adequate sun exposure cannot be achieved (from Autumn to Spring in the UK), supplementation is required (10micrograms/ day) to achieve the level required to support immune health. As an indicator, you can only make vitamin D in the sunshine once your shadow is shorter than your height.

- Omega-3 fatty acids: Omega 3 fatty acids can modulate the immune response through their anti-inflammatory and inflammation resolving actions (7).

**OMEGA-3 SOURCES:** The best source is fatty fish i.e. salmon/ mackerel. There are also plant based sources (walnuts, flaxseeds, linseeds, hemp seeds) however they are not as bio-available, so if vegetarian extra consideration should be given to regularly including these sources in the diet.

When planning an endurance challenge it is important to support your training with a varied, nutrient dense diet that matches your energy expenditure (training + daily physical activity). High carbohydrate intake is beneficial to optimise repletion of muscle glycogen stores and support hormonal regulation. Including a range of wholegrains, fruits, vegetables, nuts, seeds, healthy fats and protein sources provides a great base diet. Extra consideration may be needed for certain nutrients i.e. vitamin D supplementation throughout the winter months or for those following more restrictive diets.

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## References

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