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Rugby Nutrition:

Nutrition Fundamentals – Immunity and Health

Food provides more than just energy. Besides carbohydrate, protein and fat, there are many other nutrients including micronutrients (vitamins, minerals and electrolytes) that are essential to health and performance. Inadequate intakes of these nutrients increase your risk of injury, inflammation, decreased immunity and delayed recovery from training (Figure 1).

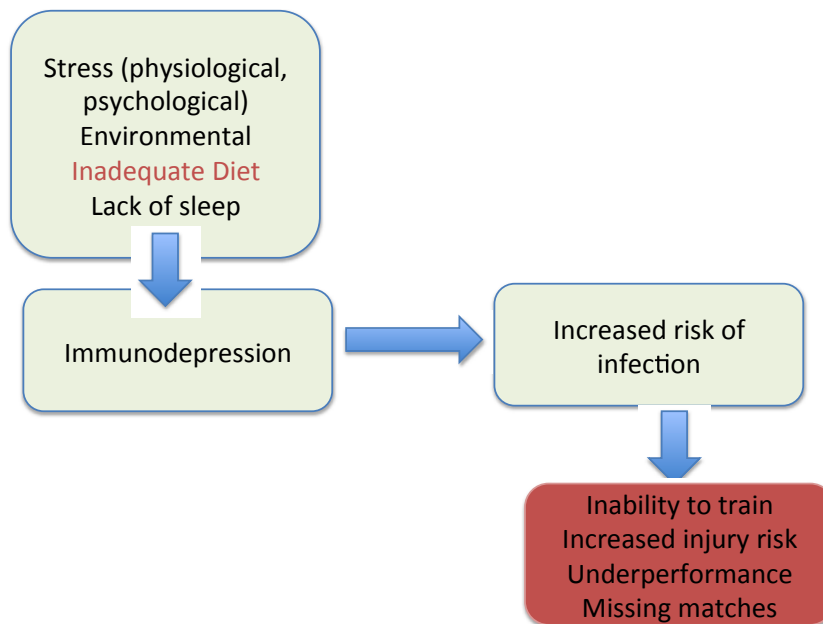


Figure 1. Micronutrient intake, immunity and performance (adapted from Gleeson M)^[1]



The list of nutrients involved with **immune function** is extensive. Apart from the Vitamins C, D, and E, the other nutrients include probiotics, quercetin and essential fatty acids, all of which can be found in a **diverse** range of foods.

The incredible benefit of eating food is that the supply of these nutrients is in safe amounts and it is unlikely to overdose with these nutrients.

Eating a **varied** diet, including **nutrient-rich foods** makes sense before considering buying supplements. Only in special circumstances and under the supervision of a registered dietitian working in sport or a sports physician, and only once food-based intervention has been exhausted, may supplements be required.

Table 1. Immune-boosting nutrients

Nutrient	Immune-boosting properties	Food Sources
Vitamin C	Acts as an antioxidant, promotes wound healing and helps resist infection	Citrus fruit, tomatoes, green peppers, guavas, strawberries
Vitamin D	Up-regulates immunity	Oily fish, egg yolks, fortified milk, soft margarine, butter (also sunlight exposure)
Vitamin E	Antioxidant which protects cells from free-radical damage	Vegetable oils, seeds, green leafy vegetables, liver
Quercetin	Antioxidant activities, reduced infection, mechanisms unclear	Apples onions, red wine, broccoli, green tea
Probiotics	Provide beneficial bacteria to the gut and other body systems which boost immunity	Fortified yoghurt and milk
Essential Fatty Acids (ω -3)	Reduces inflammation and immune benefits	Walnuts, flaxseed oil, soybean and canola oil, oily fish and fish oils

Total energy, macronutrients and fluid also impact on immune function. For example, carbohydrate beverages consumed during prolonged training sessions can reduce levels of stress hormones and reduce perception of effort. Moderate to severe deficiencies of protein, and severe deficiencies in fat, or excessive fat intake, can also lead to immune dysfunction. ^[1]

Several vitamins and minerals are involved in the production of energy. Other functions of micronutrients include bone and blood health, muscle contraction and nerve function. ^[2] (See Table 2).

Table 2. Other Functions of Micronutrients

Function	Nutrients	Food Sources
Nerve function and muscle contraction	Thiamine Riboflavin Niacin Vitamin B6 Folic acid Vitamin B12 Sodium Potassium Calcium Magnesium	Wheat germ, pork, sunflower seeds, liver, wholegrains, legumes Dairy products, meat, chicken, fish, eggs, dark green leafy vegetables Meat, chicken, fish, peanuts, organ meats Meat, chicken, fish, beans, nuts, seeds Liver, dark green leafy vegetables, yeast, wheat germ Animal products Salt, salty foods and drinks Avocado pear, banana, tomato, citrus and dried fruit, fruit juice, nuts Milk, cheese, canned salmon and sardines (fish bones), legumes, dark green leafy vegetables, tofu, sesame seeds Wholegrains, green leafy vegetables, nuts, bananas, milk
Blood health	Vitamins B6 and B12, folic acid, Vitamin C and calcium Iron	See above Lean meat, liver, chicken, fish, legumes, biltong, green leafy vegetables, fortified cereals, some dried fruit
Bone health	Vitamins B12 and D Vitamin K Calcium Zinc	See above and Table 1 Liver, green leafy vegetables, cabbage, cauliflower See above Seafood, liver, milk, wheat bran, legumes, nuts
Fluid and electrolyte balance	Sodium and potassium	See above

Ongoing attention to your diet is important to prevent the accumulation of deficiencies that will ultimately increase your risk of illness and injury.

TIPS to optimize your Micronutrient intake:^[3]

- Vegetables can be enjoyed fresh or added to stews and soups. Leftover vegetables can be added to salads.
- Fruit can be eaten with meals, or as a snack between meals. Fruit can be enjoyed eaten fresh, or with yoghurt or milk to make a fruit smoothie. On occasion, dried fruit (keeping portion size in mind) can be eaten.
- Include a variety of different coloured vegetables.
- As a general rule, when preparing fruits and vegetables, add little to no added fat, sugar and salt. The exception is when preparing dishes with vegetables rich-in beta-carotene, in which case a little oil can be added as this enhances the absorption of beta-carotene.
- Fruit and vegetable juices are lower in fibre. Bought products may have sugar or salt (vegetable juices) added and so should not be considered as a regular replacement to fresh options.
- Food should be fresh and minimally processed.
- Vitamins (water-soluble) are easily lost during storage, food preparation and cooking. To minimize these losses, store vegetables away from air, light and heat. Avoid peeling vegetables and cut just before cooking. Don't soak vegetables for a long period of time and cook them in a minimal amount of water with a tight fitting lid. Alternatively, micro-wave, steam or stir-fry.

REFERENCES:

1. Gleeson M. Nutrition support to maintain proper immune status during training. In: PINES. Sport Nutrition Conference Mallorca, 2011.
2. Deakin V. Micronutrients. In: *Sport and Exercise Nutrition*. First Edition. 2011. The Nutrition Society. Blackwell Publishing Ltd.
3. Meltzer & Associates: 2013, SISSA Nutrition Short Course. Module 5.

For more information on *Rugby Nutrition*, go to the BokSmart website www.BokSmart.com or go to the following link: <http://boksmart.sarugby.co.za/content/eating-and-drinking-right>

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