



Behind the hype: **Food and immune function**

Why is this an issue?

Many people are looking for ways to strengthen their immune system. There is a widespread misconception that it is possible to 'boost' immune function with a specific food or nutrition supplement. This can take the focus away from the importance of overall diet quality.

What is immune function?

Our immune system is our body's defence against infection from germs (such as bacteria and viruses) and foreign substances. It is made up of a complex network of organs, tissues, cells, and molecules, ranging from white blood cells and antibodies to the skin barrier. In a well-functioning immune system, all of these components work together to protect the body from infection.

Diet and immune function

Immune function is influenced by a range of factors. Some, such as age and genetics, are beyond our control. However, many lifestyle choices can support a healthy immune system, such as:

- eating a range of healthy foods
- being physically active
- maintaining a healthy weight
- getting enough sleep
- minimising stress and alcohol intake, and not smoking¹.

The immune system needs a range of essential micronutrients, in sufficient amounts, to function well. Key immune-supporting micronutrients include vitamins: A, B6, folate, B12, C, D, and E, as well as trace minerals: copper, iron, selenium, and zinc². These nutrients play a range of essential roles in the body and work together to support the immune system.

A number of vitamins and minerals (particularly vitamins A, C, and E, as well as zinc and selenium) and phytonutrients (chemical compounds found in all fruits and vegetables) also have antioxidant and anti-inflammatory properties that help to support the immune system.

Therefore, eating a healthy, balanced diet containing a wide range of nutrient-rich foods, particularly lots of fruits and vegetables, will help supply all the necessary nutrients for a healthy immune system. Table 1 shows key food sources (by food group) of immune-supporting micronutrients.

In a nutshell

- Many nutrients are involved in supporting immune function and these are found in a wide range of foods.
- Healthy individuals can generally meet all their needs for these nutrients through a well-balanced diet with a wide range of nutrient-rich foods, particularly lots of fruits and vegetables.
- Some individuals may not be able to get enough of a certain nutrient from the diet and may benefit from a supplement. Advice from a registered health professional is recommended before taking any supplements.

Supplements and immune function

Most people can easily get all the essential micronutrients by eating a healthy, balanced diet. Equally, all the benefits of a healthy diet cannot be replaced with a supplement. At times, some people may be unable to get enough of a certain essential nutrient, putting them at risk of deficiency. For example, during pregnancy and breastfeeding³. In these cases, a registered health professional will advise which supplements are recommended.

Research is ongoing into the immune effects of specific nutrients. There is some, limited evidence that certain supplements may offer small benefits for immune function. Vitamin C and zinc supplements, for example, may have a small effect on the duration or severity of the common cold. However, high dose supplements of vitamin C (over 1,000mg/day) can have adverse effects, such as an upset stomach, and are not recommended. It is better to consume nutrients as foods, even for people who have a cold (see Table 1 for food sources of vitamin C).

At this stage, the overall evidence on specific nutrients and immune function remains inconclusive. There are also risks to taking supplements at high doses. For example, fat soluble vitamins (such as vitamin A) can potentially cause harm, as excess is stored in the body. Advice from a registered health professional is recommended before taking supplements.

What about pre and probiotics and immune function?

Gut microbiome diversity - the balance and variety of all the different micro-organisms (bacteria) living in our gut - plays a key role in immune function¹.

Some people choose to take probiotic supplements (live bacteria) or prebiotics (food components that can support the growth of beneficial bacteria). Research is ongoing into the potential benefits of pre and probiotics, and results are still inconclusive. Maintaining a healthy diet with a wide range of fibre-rich plant foods (fruits, vegetables, nuts, legumes, and whole grains), and limiting intake of salt, sugar, artificial sweeteners, alcohol, and processed foods will support a healthy gut. Probiotics can also be eaten naturally in foods such as yoghurts, and fermented foods like sauerkraut and kimchi (See the *Behind the Hype: Fermented foods fact sheet*⁴).

Table 1: Key food sources of immune-supporting micronutrients^{5,6}

Foods	Key micronutrients
Fruits and vegetables	
Dark leafy greens (eg, spinach, kale), yellow and orange vegetables (eg, carrots, kumara, pumpkin)	Beta-carotene, can be converted into Vitamin A by the body
Bananas, avocados, green pepper	Vitamin B6
Green vegetables (eg, spinach, broccoli, Brussels sprouts, green peas), bananas, oranges, strawberries	Folate
Oranges, kiwifruit, berries, tomatoes, peppers, broccoli, Brussels sprouts	Vitamin C
Legumes, nuts and seeds, fish and other seafood, eggs, poultry, red meat (fat removed)	
Legumes (eg, dried beans, lentils, chick peas, split peas)	Vitamin B6 (especially soy beans), folate, copper, iron, zinc
Nuts and seeds	Vitamin B6, folate, vitamin E, copper, iron, selenium (especially Brazil nuts, cashews & sunflower seeds), zinc (especially pumpkin & sesame seeds, pine nuts)
Fish and other seafood	Vitamin A (salmon, tuna), vitamins B6 and B12, vitamin D (oily fish), copper, iron (especially canned sardines & mussels), selenium, zinc (shellfish such as crab & mussels)
Eggs	Vitamins B6 and B12, vitamin D, selenium
Poultry	Vitamin B6, iron, selenium, zinc
Red meat	Vitamins B6 and B12, copper, iron, zinc
Whole grains	
Whole grain bread, rice, pasta, cereals	Vitamin B6, folate, copper, iron, selenium, zinc
Milk and milk products	
Whole milk, yoghurt, cheese	Pre-formed vitamin A (retinol), vitamin B12, vitamin D (also in fortified dairy alternatives), zinc

Immune-boosting diets

There is currently no scientific evidence to support claims that adopting restrictive diets (such as an alkaline or ketogenic diet) can boost immune function and protect against infectious disease. Adopting any diet where entire food groups or nutrients are restricted can mean missing out on essential vitamins and minerals⁷. This is more likely to weaken the immune system than support it.

References

1. Harvard T. H. Chan School of Public Health. 2020. Nutrition and Immunity. Retrieved from: <https://www.hsph.harvard.edu/nutritionsource/nutrition-and-immunity/>. Accessed July 2020.
2. Calder, PC. 2020. Nutrition, immunity, and COVID-19. *BMJ Nutrition, Prevention & Health*. *bmjnph-2020-000085*. doi: 10.1136/bmjnph-2020-000085. Accessed July 2020.
3. Health Promotion Agency. 2020. Behind the hype: Nutrition supplements in pregnancy and breast feeding. May 2020. Retrieved from: <https://www.nutritionandactivity.govt.nz/sites/default/files/1.6%20262%20NPA%20Behind%20the%20Hype%20Nutrition%20supplements.pdf>. Accessed July 2020.
4. Health Promotion Agency. 2020. Behind the Hype: Fermented foods. July 2020. Retrieved from: <https://www.nutritionandactivity.govt.nz/nutrition/behind-hype-information-sheets>. Accessed July 2020.
5. Ministry of Health. 2015. Eating and Activity Guidelines for New Zealand Adults. Wellington: Ministry of Health. Accessed July 2020.
6. NZ Nutrition Foundation. 2018. Nutrition Facts. Retrieved from: <https://nutritionfoundation.org.nz/nutrition-facts>. Accessed July 2020.
7. Health Promotion Agency. 2019. Behind the Hype: Weight loss diets. June 2019. Retrieved from: <https://www.nutritionandactivity.govt.nz/sites/default/files/Weightloss%20diets%202019.pdf>. Accessed July 2020.



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