



# Essential vitamins for immunity

by

**bimuno**<sup>®</sup>

# Vitamin C

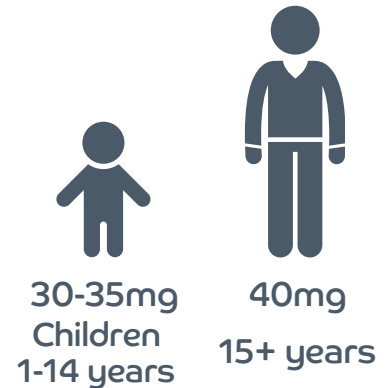
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## Role in Immunity

Vitamin C plays a critical role in supporting immune health and is involved in many functions, including:

- Supporting gut barrier function and integrity
- Protecting against invading pathogens
- Promoting oxidant scavenging to protect against oxidative stress
- Possessing antioxidant and anti-inflammatory properties

## Daily recommendation\*



## Sources of Vitamin C

Unlike most animals, humans cannot produce vitamin C internally, making it an essential nutrient that must be obtained through the diet.

Rich sources of vitamin C include:



Fruits and juices: oranges, kiwis, cantaloupe, strawberries, papaya, tomatoes.



Vegetables: kale, cauliflower, broccoli, brussels sprouts, bell peppers, chillies.



Food supplements



## Link to the gut

Research suggests that vitamin C may modulate gut microbiome composition, increasing microbial diversity and the production of short-chain fatty acids (SCFAs) (Barone et al., 2022).

SCFAs, important secondary metabolites, play a key role in health by regulating gut barrier integrity and immune cell activity (Mann et al., 2024).



\*Public Health England (2016). Government Dietary Recommendations Government Recommendations for Energy and Nutrients for Males and Females Aged 1 - 18 Years and 19+ Years. [online] GOV.UK. Public Health England

Barone, M., D'Amico, F., Brigidi, P. and Turrioni, S. (2022). Gut microbiome-micronutrient interaction: The key to controlling the bioavailability of minerals and vitamins? *BioFactors*, [online] 48(2), pp.307-314.

Mann, E.R., Ying Ka Lam and Uhlig, H.H. (2024). Short-chain fatty acids: linking diet, the microbiome and immunity. *Nature reviews. Immunology*, [online] 24.



# Vitamin D

Vitamin D is primarily produced in the skin through exposure to sunlight.

## Role in Immunity

Vitamin D has been shown to control the growth of immune cells, such as T and B lymphocytes, dendritic cells and macrophages, which can influence the immune response (Sirbe et al., 2022).

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## Daily recommendation\*



## Sources of Vitamin D

The most effective way to obtain vitamin D is through exposure of the skin to ultraviolet-B rays. Minor amounts can also be found in certain animal-based foods, including:

 Fish: Salmon, mackerel, sardines.

 Eggs, beef, liver, milk

 Supplement: especially during October to March in the UK when sunlight exposure is limited



## Link to the gut

Research suggests that vitamin D can regulate intestinal barrier integrity and influence the gut microbiome to exert anti-inflammatory and immunomodulatory effects, and therefore could be beneficial for both immune and gut health (Akimbekov et al., 2020).



\*Public Health England (2016). Government Dietary Recommendations Government Recommendations for Energy and Nutrients for Males and Females Aged 1 - 18 Years and 19+ Years. [online] GOV.UK. Public Health England

Akimbekov, N.S., Digel, I., Sherelkhan, D.K., Lutfor, A.B. and Razzaque, M.S. (2020). Vitamin D and the Host-Gut Microbiome: A Brief Overview. *Acta Histochemica et Cytochemica*, [online] 53(3), pp.33-42.

Sirbe, C., Rednic, S., Grama, A. and Pop, T.L. (2022). An Update on the Effects of Vitamin D on the Immune System and Autoimmune Diseases. *International Journal of Molecular Sciences*, [online] 23(17), p.9784.

# Zinc

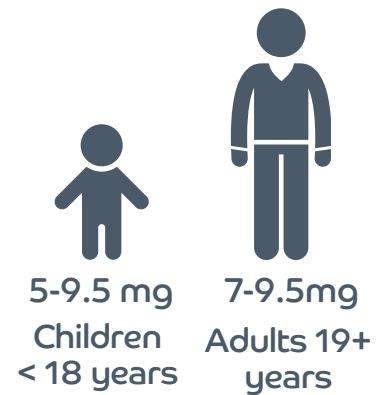
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## Role in Immunity

Zinc is considered a “gatekeeper” in immune health and is involved in:

- Cell division
- Immune cell maturation and differentiation
- Protection from oxidative stress

## Daily recommendation\*



## Sources of Zinc

Since the human body can't store zinc for long periods, it's crucial to get a steady supply through diet. Zinc is found in a variety of foods, such as:



Nuts and seeds: pumpkin, hemp, cashews, almonds



Shellfish (oyster), lamb, grass-fed beef



Food Supplement



## Link to the gut

Zinc is essential for intestinal barrier function and deficiency is associated with barrier dysfunction and increased intestinal permeability, which can lead to the invasion of pathogens (Wan and Zhang., 2022).

\*Public Health England (2016). Government Dietary Recommendations Government Recommendations for Energy and Nutrients for Males and Females Aged 1 - 18 Years and 19+ Years. [online] GOV.UK. Public Health England

Wan, Y. and Zhang, B. (2022). The Impact of Zinc and Zinc Homeostasis on the Intestinal Mucosal Barrier and Intestinal Diseases. Biomolecules, [online] 12(7), p.900