Nutrients and ingredients for immunity against viral respiratory infections

How a viral respiratory infection is established

VIRUS ENTERS THE BODY	BEFORE VIRUS ENTERS CELLS	VIRUS REPLICATES	KILLING OF CELLS	CELLS DAMAGED	EFFECT ON LUNGS
Natural barrier	**Immune response**	**Inside the cell**	**Damage begins**		**Lung damage**
The nose, throat and lungs are lined with epithelial tissue. Strong integrity of this layer guards against viral entry into the body.	The body produces more immune cells and activates their functions to clear the virus before it enters the host cells.	When the virus is inside a cell, it replicates and causes cell death.	Immune cells generate free radicals to destroy the virus. But the overwhelming assault produces excessive free radicals and also damages healthy cells.	Hyperactive immune cells release large amounts of pro-inflammatory cytokines, causing damage to both infected and healthy cells.	If the virus is virulent, the inflammatory response may be aggressive and the lungs may be damaged. If left unchecked, this may lead to lung failure.

Nutrients and ingredients for respiratory viruses

Based on the mechanisms of action of viruses (as outlined above), the Blackmores Institute has developed six key criteria to identify the most important nutrients and ingredients for immune system health. These substances help support the immune system to defend against respiratory viruses. To be on the Blackmores Institute recommended list, a nutrient or ingredient must have four or more mechanisms of relevance.

6 key criteria / Nutrients/ ingredients	1 Improves first line of defence against viral entry (nose, throat, lung)	2 Establishes immune-regulation activity	3 Exhibits antiviral activity of relevance to viral respiratory infections	4 Possesses antioxidant activity	5 Modulates inflammatory response to dampen hyper-inflammation	6 Low dietary intake and sub-optimal nutritional status is common	Score
ZINC	✓	✓	✓	✓	✓	✓	6/6
VITAMIN D*	✓	✓	✓		✓	✓	5/6
VITAMIN C	✓	✓		✓		✓	4/6
QUERCETIN			✓	✓	✓	✓	4/6

* Although vitamin D was ranked the second in term of mechanisms of relevance, it is one of the most studied micronutrients and its beneficial effect was discussed in many reviews and scientific literatures, as compared to other food ingredients and bioactive compounds in supporting immune functions, particularly against viral respiratory infections.

Nutrient and ingredient recommendations to protect against respiratory viruses

Nutrient/ Ingredient	Why	Dose
Zinc	• Antioxidant, anti-inflammatory and antiviral, balances the immune response during infection[1,2] • Up to 50% of people have sub-optimal zinc status[3] • Supplementation helps the body protect against viral entry through the nose, throat and lungs by strengthening the integrity of epithelium and improving mucociliary clearance[2] • Supplementation decreases viral replication, preserves antiviral immunity, lessens the risk of hyper-inflammation, has potential to reduce lung damage via antioxidant effects[2] • Take with an ionophore (such as quercetin) to increase effects	25 mg/day During infection: 50-75 mg/day for 1-2 weeks
Vitamin D	• Modulates innate and adaptive immune responses, boosts mucosal defences, dampens excessive inflammation and has antiviral properties via reducing viral entry into cells[1,4] • Very few foods contain significant amounts of vitamin D, so adequate exposure to sunlight is essential. Nearly 1 in 4 Australian adults have vitamin D deficiency, with the rate of deficiency much higher in winter[5] • Low vitamin D status increases the risk of viral respiratory infections and severity of symptoms[1,4]	1000-5000 IU/day, or higher if deficient
Vitamin C	• Antioxidant, anti-inflammatory, required for optimal cellular immune function, reduces tissue damage associated with immune responses via antioxidant activity[1,4] • One of the most important antioxidants for the lungs where it protects against free radical damage due to inflammation and free radicals in the environment[3] • During acute infection, body requirements go up significantly as immune cells draw on vitamin C stores • Recycles other antioxidants such as vitamin E and quercetin • Many people don't meet the daily requirements for consuming adequate fruit and vegetables so are at risk of sub-optimal vitamin C status	500 mg-1 g/day During infection: Up to 6 g/day, in divided doses throughout the day
Quercetin	• Antioxidant, anti-inflammatory, has a broad range of antiviral and immunomodulatory activities[6] • Is a zinc ionophore[6], which means it enables more zinc to enter cells, thereby increasing the effects of zinc without increasing the dose to inhibit viral replication • Quercetin and vitamin C used together exert synergistic antiviral actions due to overlapping antiviral and immunomodulatory properties; also vitamin C recycles quercetin thereby amplifying its effect[6] • Usual diet contains less than 100 mg/day[6] – therapeutic levels are above 400 mg/day	400-600 mg /day Absorption improved with black tea

Notable herbal medicines

Ideal to be used with the key immune nutrients and ingredients

Andrographis
Immune-modulating, anti-inflammatory and symptom relief (i.e. cough, headache, sore throat)

Echinacea
Immune-modulating, anti-inflammatory and antiviral activity

Pelargonium
Immune-modulating, antiviral activity and symptom relief

Black seed oil
Immune-modulating, antiviral activity and anti-inflammatory

References

1. Gasmi A, et al. Micronutrients as immunomodulatory tools for COVID-19 management. *Clin Immunol*. 2020;220:108545. **2.** Wessels I, et al. The potential impact of zinc supplementation on COVID-19 pathogenesis. *Front. Immunol*. 2020; 11:1712. **3.** Braun L, Cohen M. *Herbs and Natural Supplements*. Ebook 4th edition. Chatswood: Elsevier 2014. **4.** James PT, et al. The role of nutrition in COVID-19 susceptibility and severity of disease: A systematic review. *J Nutr*. 2021;151(7):1854-1878. **5.** Australian Bureau of Statistics (ABS). *Australian Health Survey: Biomedical results for nutrients*, 2011-12. ABS website, accessed 31 January 2022. **6.** Agrawal PK, et al. Quercetin: Antiviral significance and possible COVID-19 integrative considerations. *Natural Product Communications*. 2020;15(12): 1–10.