nuzest®

# Technical Bulletin

# KIDS GOOD STUFF


ISSUE: February 2020

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# DISCLAIMER

The information contained in this document has been prepared independently as a guide to Healthcare practitioners (HCPs) considering Kids Good Stuff as a recommended supplement to clients and/or patients. It draws upon existing scientific research on the human biosystem, on nutritional supplementation in general and on specific forms of vitamins, minerals and other nutrients contained in the product.

This document is not a guide to or an endorsement of Kids Good Stuff, or of any supplement or individual ingredient, for use as a prevention or cure for any illness or disease.

The opinions and conclusions expressed in this document are those of the authors, reached after analysis of available scientific research papers and personal experience in clinical practice. HCPs should not rely solely on the opinions expressed or information contained in this document but are encouraged to conduct independent research to reach their own conclusions.

It is further emphasised that Nuzest Kids Good Stuff has been formulated as a general food supplement to a normal diet. It has not been formulated for therapeutic purposes and does not claim to prevent or cure any disease. It is simply a comprehensive blend of nutrients designed to help fill the gaps of missing or depleted nutrients as a support formula for general health and wellbeing.

## Scientific advisor:

### Cliff Harvey ND, PhD

**Founder Holistic Performance Nutrition**

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Cliff Harvey is an author, clinician, and active researcher examining clinical applications of ketogenic and lower-carbohydrate diets and mind-body therapies. Since 1998 he has been applying a “Carb-Appropriate” nutritional approach in his practice, blending the best of traditional and non-traditional nutritional science to help athletes perform better and to help those with chronic illness to recover health.

He is the author of several best-selling books and is a contributor to magazines and media worldwide. Cliff is also a strength athlete holding several world records and is a two times IAWA Weightlifting World Champion.

## SCIENTISTS HAVE DEBATED THAT LONG-TERM HEALTH IS SUPPORTED BY DAILY SUPPLEMENTATION OF A MULTI-VITAMIN.

As adults, many of us don't get all the essential micronutrients that we need to thrive from diet alone. This is especially true of vitamin A, B1, B6, B12, iron, magnesium, zinc and selenium[1,2]. Without all of these vital nutrients, we are unable to perform well or have robust good health and this is true for kids too!

Insufficient intakes of nutrients rise rapidly from infancy. From the age of two to four and 14-18, around one third of males and over one quarter of females do not consume sufficient vitamin A. Around one in 10 young women don't have sufficient vitamin B1 and folate; one in 20 sufficient B12, and one in five sufficient B6. Inadequacy of essential minerals is even more pronounced, with around 80% consuming inadequate amounts of calcium by the age of 18 and over 60% consuming inadequate amounts of magnesium. Iodine, iron, and phosphorus intakes are also particularly concerning in young women, while for boys zinc is reported to be the mineral of concern, with rates of zinc insufficiency rising from almost none at two to four years to over two thirds by older adulthood[2].

The major reason for not getting all we need from diet alone is simple; we eat more refined and processed foods. In fact, around one third or more of our daily energy intake comes from 'discretionary foods'. Discretionary foods and drinks are "not necessary to provide the nutrients the body needs". They are rich in energy (calories) and low in the essential and secondary nutrients that are beneficial to overall health[2].

Research also indicates that overtime we are eating fewer nutrient-rich whole foods. It is reported that less than half of us eat the recommended amounts of vegetables and fruit that we should to optimise health[3]. There have also been changes noted in our snacking behaviours, with snacking (identified as food consumed outside of meal times) contributing to 35% of total energy intake for over 95% of Australian children (aged 2-6 years).

Furthermore, the quality of our foods have changed. The US Department of Agriculture data shows that some fresh produce (some vegetables, fruits and berries) may only provide around half the amounts of some vitamins and minerals that they did in the 1950s[4]. So, while we have been eating more over time, and taking in more than enough calories and 'fuel', we aren't necessarily getting enough of the 'little guys' - the vitamins, minerals and secondary nutrients that help every system of the body run optimally.

There are additional reasons as to why our diets are becoming more insufficient:

- Increasingly stressful lifestyles which increase our demand for micronutrients.
- A longer 'food chain' (i.e. more time in transport and storage and less local, fresh produce) which can reduce the amounts of nutrients (especially fragile, water-soluble vitamins)
- Lack of variety in food choices and fewer people choosing wild foods (like previously popular vegetable choices such as dandelion, sow thistle etc.)

A multivitamin is never a substitute for healthy eating, and the focus should always be on working towards a diet mostly based on natural, unrefined foods. Multivitamins however, can help to 'fill the gaps' in nutrition and are considered a safe and

# WHY SUPPLEMENT?

effective way to ensure a healthy intake of essential and beneficial nutrients[5]. In a study of school-age children, memory test scores were improved in children taking a multivitamin[6].

Additionally, supplementation to ensure the adequacy of various nutrients including vitamins B, C, D, and zinc and magnesium might help to:

- improve migraines[7,8]
- improve growth rates, muscle and blood markers of later health risks[9-13]
- improve behaviour and cognition[14-16]
- reduce respiratory problems[17-20]

The shift towards more sugar and 'ultra-refined' processed foods has been detrimental to kids' health, and our key focus should be on encouraging the receptive minds of young people to become reconnected to the REAL food that their growing bodies and active minds need.


'Why supplement?' references available upon request.

# PURPOSE/FUNCTION

Kids Good Stuff supports all eleven systems of the body to optimally fuel kids with stable energy supporting happy and healthy bodies.

Kids Good Stuff is not a substitute for healthy, balanced meals, but is a daily supplement to help fill key gaps in the diet of growing, active kids, so they can be at their best.

Built on a foundation of nutrient-rich wholefoods including microalgae, mushrooms, vegetables and high polyphenol fruit and berry extracts, Kids Good Stuff provides the all-important armoury of phytonutrients, trace and ultra-trace minerals necessary for proper absorption and utilisation of the vitamins, minerals and other isolated nutrients used to fortify the formula.

In addition, enzymes, soluble fibre and macrobiotics support digestion and the microbiome and immune and inflammatory modulation, while herbs and other ingredients supply nutrients to support the innate immune, digestive and excretory functions of the body. The blend of ingredients produces a powerful synergistic effect of nutritional benefit.

Levels, forms and ratios of vitamins, minerals and other supportive nutrients have been determined and optimised through a thorough evaluation of available scientific reviews and supporting scientific evidence. Specific forms of vitamins and minerals have been selected based on maximum bioavailability; with efficacy and safety being the driving forces behind the formulation.

# THE ELEVEN BODY SYSTEMS

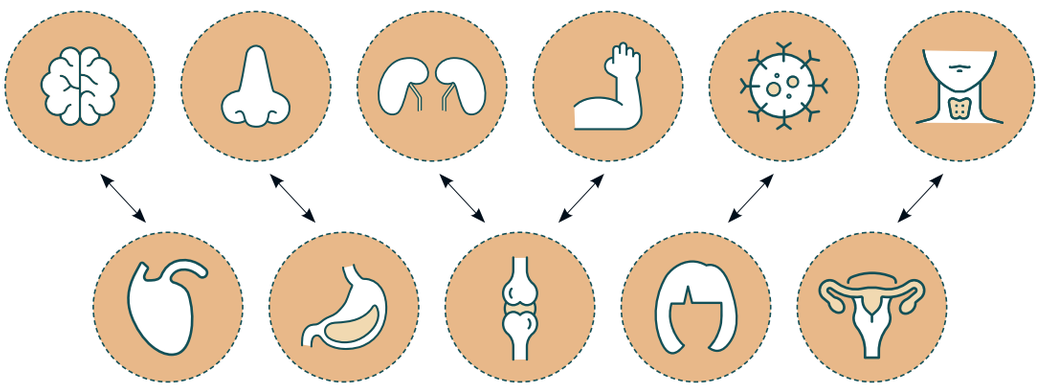
No vitamin, mineral or other nutrient has a specific single function. They all work in support of each other in a range of functions within the human ecosystem. Some of those nutrients are produced by the body's own chemistry while others need to be introduced directly through the food chain.

Food provides essential ingredients for the body's information systems and, like any chemical formula, if an element is missing or out of balance it can have dire consequences. In the case of the human body, it can lead to long term chronic health issues, or at best an impairment to optimal function. This indeed is the rationale behind supplementation; provision of missing nutrients and boosting of those that are deficient.

We know through clinical evidence that most people are deficient to various degrees in some or many of the essential nutrients. This may be a result of lifestyle demands, poor dietary choices, low-quality food, soil depletion or a person's own biological inefficiency due to various genetic, age or health-related reasons.

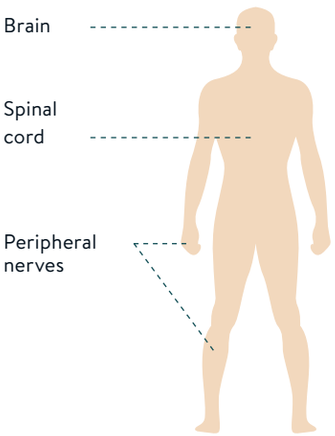
For optimum health, the body requires thousands of different nutrients, many of which have not even yet been identified, let alone studied. Our knowledge of the roles of even the essential nutrients, which have been subject to extensive research, is ever-evolving.

Hence the following diagram, which aims to show which nutrients added to Kids Good Stuff support which body system, is simplistic in its construction. The total picture is far more complex and is still largely unknown. However, it is an accurate portrayal of what we know through science today of which ingredients play a major role within each system.

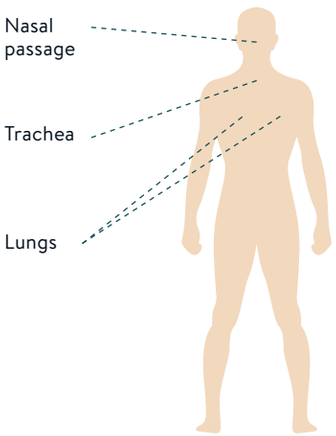


# 11 Body Systems

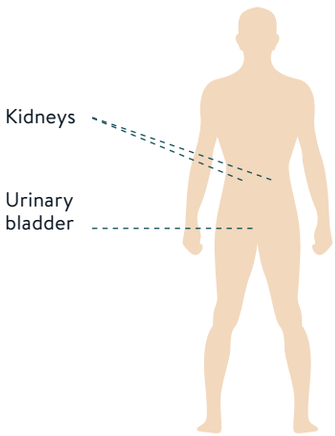
## **Nervous** System



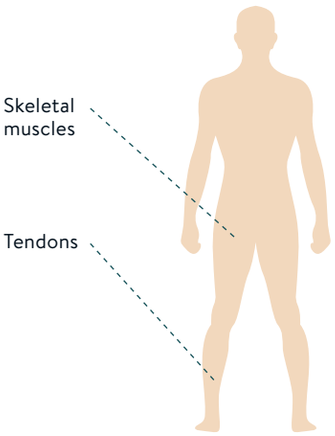

## **Respiratory** System



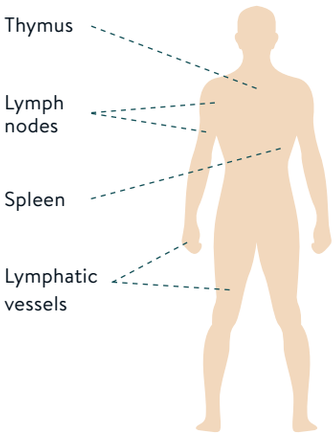

## **Excretory** System



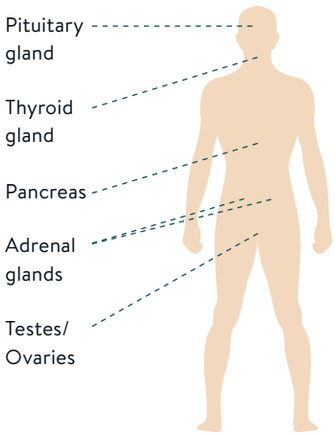

## **Muscular** System



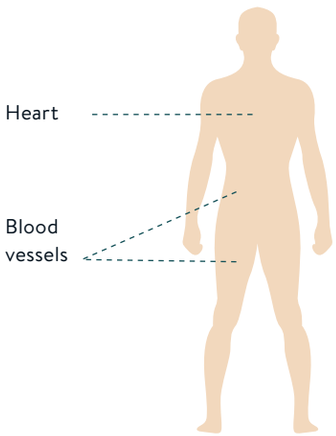

## **Immune** System



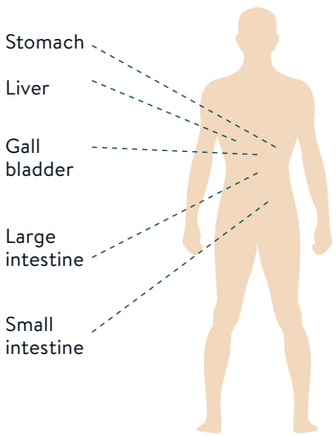

## **Endocrine** System



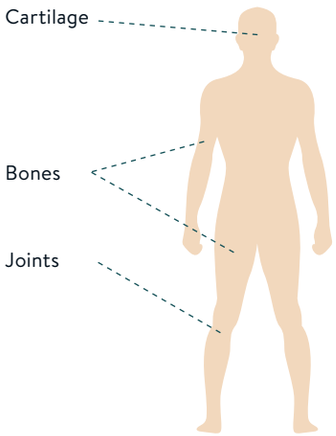
## **Circulatory** System



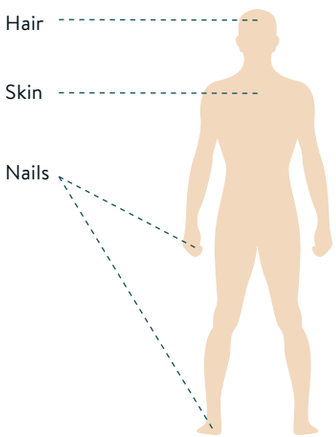

## **Digestive** System



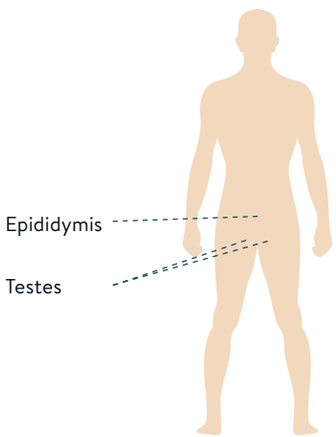

## **Skeletal** System



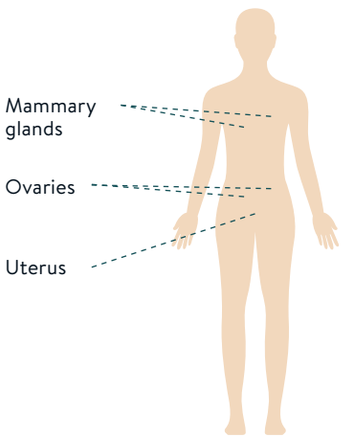

## **Integumentary** System




## **Reproductive** System




## **Reproductive** System



# System, Function, Ingredient

| Body system | Key organs and tissue | Functions | Ingredients in Kids Good Stuff that support this system |
|---|---|---|---|
| **Circulatory** | Heart, arteries, veins, arterioles, capillaries, venules | • Delivers oxygen and nutrients to cells throughout the body and takes wastes away<br>• Functions as a 'cooling system' for the body by increasing or reducing blood flow to the skin and extremities | • Apple pectin<br>• Bioflavonoids<br>• Copper<br>• Digestive enzymes<br>• *Dunaliella salina*<br>• Flaxseed<br>• Fruit and berry blend<br>• Grape seed<br>• Magnesium<br>• Pea protein isolate<br>• Probiotics<br>• Psyllium husk<br>• Spirulina<br>• Vegetable blend<br>• Vitamin B1, B12, B3, B5, B6, B9, C, E, K<br>• Zinc |
| **Digestive and excretory** | Mouth, oesophagus, stomach, small and large intestine | • Absorbs nutrients from the gastrointestinal tract and removes waste (mostly solid) oesophagus, stomach and intestines.<br>• Eliminates waste from the body. | • Apple pectin<br>• Barley grass<br>• Bioflavonoids<br>• Dandelion<br>• Digestive enzymes<br>• Ginger<br>• Prebiotics<br>• Probiotics<br>• Psyllium husk<br>• Spirulina<br>• Vitamin B5<br>• Wheat grass<br>• Zinc |

| | | | |
|---|---|---|---|
| **Endocrine** | Pineal gland, pituitary gland, pancreas, ovaries, testes, thyroid gland, parathyroid gland, hypothalamus and adrenal glands | • Influences the function of other cells and tissue through chemical messengers (hormones) | • Vitamin A , B5, B6, B9, D, E<br>• Calcuim<br>• Iodine<br>• Magnesium<br>• Manganese<br>• Selenium<br>• Zinc<br>• Flaxseed<br>• Beta-glucans<br>• Psyllium husk<br>• Ginger<br>• Probiotics<br>• Spirulina<br>• Kelp<br>• *Dunaliella salina* |
| **Integumentary** | Skin, hair, nails, sweat and other exocrine glands | • A physical barrier to help prevent infection, allow an appropriate internal environment, and includes connective tissue to stabilise and protect the body | • Beta-glucans<br>• Digestive enzymes<br>• Pea protein isolate<br>• Vitamin B5, B7 (Biotin), C, D |
| **Renal and urinary** | Kidneys, ureters | • Removes waste, excess acids and bases, or liquids via the filtration of the kidneys and excreted in urine | • Dandelion<br>• Vitamin B5 |
| **Reproductive** | Penis, vagina | • Production of offspring | • Ginger<br>• Grapeseed<br>• Vitamin B5, B6 |

# System, Function, Ingredient

| Body system | Key organs and tissue | Functions | Ingredients in Kids Good Stuff that support this system |
|---|---|---|---|
| **Immune** | White blood cells | • Innate, complement<br>• Adaptive | • Apple pectin<br>• Barley grass<br>• Bioflavonoids<br>• Dandelion<br>• Digestive enzymes<br>• Flaxseed<br>• Fruit and berry blend<br>• Ginger<br>• Grapeseed<br>• Kelp<br>• Manganese<br>• Prebiotics<br>• Probiotics<br>• Red marine algae<br>• Selenium<br>• Spirulina<br>• Vegetable blend<br>• Vitamin A , B12, B5, B7, B9, C, D, E, K<br>• Wheat grass<br>• Zinc |

| | | | |
|---|---|---|---|
| **Nervous** | Brain, spinal cord, central and peripheral nervous system | • Collects, processes, and transmits information from the senses, via nerves and the brain, to the body | • Bioflavonoids<br>• Brahmi<br>• Copper<br>• Magnesium<br>• Potassium<br>• Sunflower lecithin<br>• Vegetable blend<br>• Vitamin A , B1, B12, B3, B5, E<br>• Zinc |
| **Respiratory** | Nose, nasal cavity and sinuses, pharynx, larynx trachea, lungs: bronchi, bronchioles and the alveoli | • Extracts oxygen from the air to take into the body and removes carbon dioxide<br>• Also, an excretory channel to get rid of excess acid | • Bioflavonoids<br>• Fruit and berry blend<br>• Vegetable blend<br>• Vitamin B5 |

# NUTRITION FACTS & INGREDIENTS

| VITAMINS & MINERALS | PER SERVE | %RDI* |
|---|---|---|
| Vitamin A | 400µg RE | 63% |
| Vitamin B1 | 2.2mg | 293% |
| Vitamin B2 | 3.4mg | 354% |
| Vitamin B3 | 10mg | 81% |
| Vitamin B5 | 5mg | 109% |
| Vitamin B6 | 1.6mg | 160% |
| Vitamin B9 | 200µg | 67% |
| Vitamin B12 | 5µg | 278% |
| Vitamin C | 100mg | 261% |
| Vitamin D3 | 10µg | 200% |
| Vitamin E | 10mg TE | 122% |
| Vitamin K | 80µg | 178% |
| Biotin | 60µg | 280% |
| Calcium | 206mg | 21% |
| Magnesium | 50mg | 18% |
| Zinc | 6mg | 83% |
| Iron | 1.4mg | 13% |
| Manganese | 1mg | 34% |
| Copper | 0.3mg | 25% |
| Selenium | 21µg | 40% |
| Chromium | 20µg | 83% |
| Iodine | 75µg | 63% |

| PLANT FOODS | PER SERVE |
|---|---|
| Pea protein isolate | 9g |
| Cocoa powder^ | 2.1g |
| Beetroot | 400mg |
| Red marine algae | 500mg |
| Flaxseed | 250mg |
| Sunflower lecithin | 200mg |
| Broccoli sprouts | 100mg |
| Spinach | 100mg |
| Carrot | 100mg |
| Spirulina | 100mg |
| Barley grass | 100mg |
| Wheat grass | 100mg |
| Papaya | 50mg |
| Ginger | 40mg |
| Kelp | 30mg |
| **FIBRES & PROBIOTICS** | **PER SERVE** |
| Apple fibre | 860mg |
| Apple pectin (prebiotics) | 200mg |
| Psyllium husk | 100mg |
| *L. acidophilus* | 1.5B CFU |
| *B. lactis* | 1.5B CFU |

# NUTRITION FACTS & INGREDIENTS

| PLANT EXTRACTS† | PER SERVE |
|---|---|
| Blackcurrant (200:1) | 200mg |
| Grape seed (120:1) | 200mg |
| Acerola (4:1) | 100mg |
| Goji berry (4:1) | 100mg |
| Bilberry (100:1) | 100mg |
| Brahmi (20:1) | 50mg |
| Dandelion (4:1) | 30mg |
| **SPECIALTY BLEND** | **PER SERVE** |
| Citric acid | 150mg |
| Citrus bioflavanoids | 70mg |
| Bromelain (enzyme) | 30mg |
| R,S alpha-lipoic acid | 20mg |
| 1,3/1,6 beta-glucans | 8mg |
| *Dunaliella salina* | 8mg |
| Lutein | 2mg |
| Zeaxanthin | 0.4mg |

Per 15g Serve. All values are averages across all flavours.
*Average Recommended Dietary Intake (NRV 2012) for children aged 4-14 years.
^Rich Chocolate only. †Extract equivalent amount

## VITAMINS

### Vitamin A

**Form:**
Retinyl palmitate and mixed natural carotenoids (including beta-carotene) from *Dunaliella salina*
**Key body systems:**
Immune, nervous (vision), endocrine

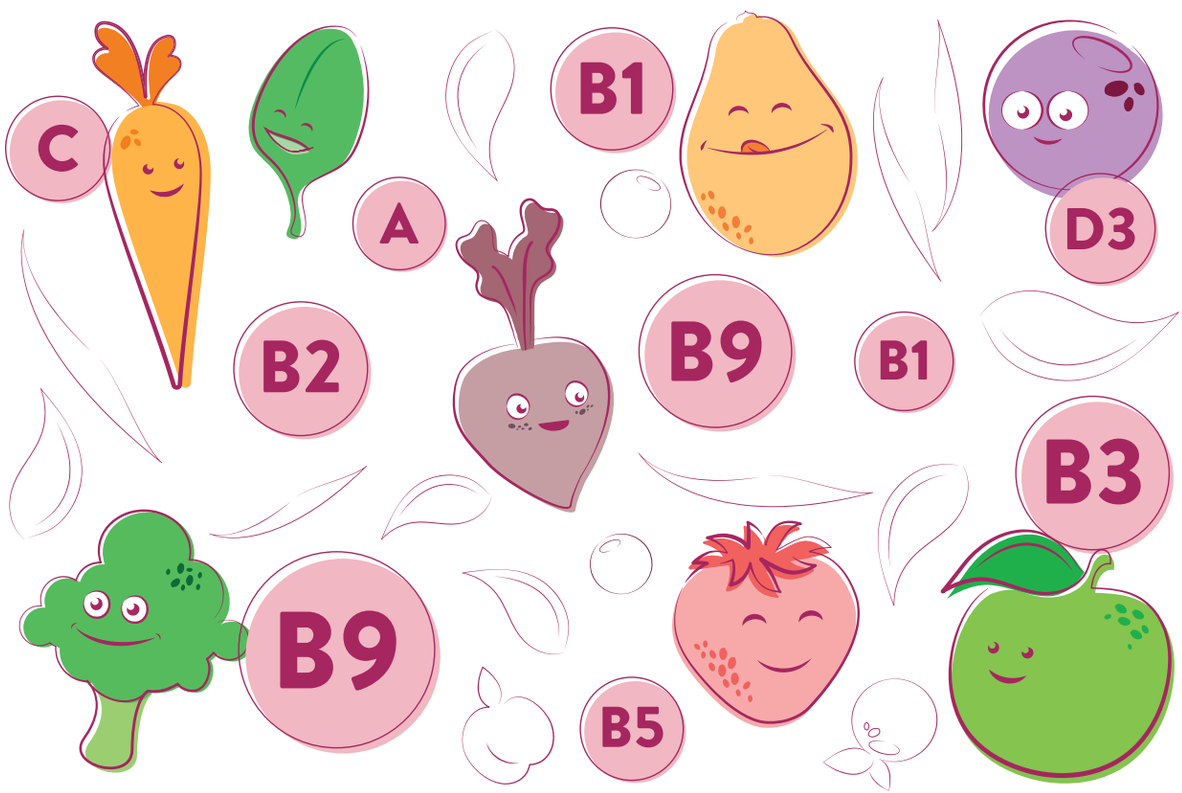
Vitamin A is a group of essential, fat-soluble vitamins including retinol, retinal, retinoic acid, and provitamin A carotenoids (most notably beta-carotene) which can be converted to 'active' vitamin A.

Vitamin A is important for growth and development, immunity, and for vision, especially low-light and colour vision. Vitamin A also functions via retinoic acid which is a hormone-like growth factor for epithelial and other cells.

**Key benefits of vitamin A supplementation:**

- Improved immunity and resistance to infection
- Improved vision
- Reduced risk of anaemia
- Improved immunity and resistance to infection
- Possible reduced risk of later obesity and diabetes

Vitamin A deficiency is the leading cause of preventable vision problems and blindness in children, along with severe impacts on immunity.[1] Vitamin A supplementation is associated with reductions in illness, mortality, and vision problems in children and it has been recommended that any children at any



risk of deficiency should be given a vitamin A supplement.[2] A systematic review and analysis using a Chinese cohort has demonstrated that the incidence of actual and sub-clinical vitamin A deficiency increase with age and is more common in rural and under-developed areas.[3]

**Why retinyl palmitate**

While this form is usually found in foods of animal origin, it can also be produced in a vegan (non-animal) form, which is included in this product. Retinyl palmitate is an ester of vitamin A that is immediately converted to the active, bioavailable storage form of vitamin A—retinol, in the small intestine. Unlike vegetable-derived carotenoids like beta-carotene, retinyl palmitate does not need to undergo additional processing and conversion to active vitamin A in the body. This conversion process to usable vitamin A from carotenoids can differ by a factor of nine-fold.[4] Whole food sources of beta-carotene may be required in amounts around four times higher than taking a preformed vitamin A supplement.[5,6]

However, excessive doses of preformed vitamin A can be toxic, especially for children, whereas carotenoids cannot be converted to active vitamin A in excessive amounts. For these reasons, pre-formed vitamin A is included in this product along with mixed carotenoids to provide maximum benefit, safely.

## Vitamin B1 – Thiamin

**Form:**
Thiamin hydrochloride
**Key body systems:**
Circulatory, muscular, nervous

Thiamin (or thiamine) was the first B-vitamin to be discovered and the first vitamin to be isolated, hence its classification as 'B1'. Food sources include whole grains, legumes, meats and fish. However, processing of grains removes much of the thiamine content. Vitamin B1 deficiency known as 'beri-beri' was a common illness in developing countries but is not commonly seen in developed nations despite around 20% of people potentially not meeting their B1 requirements from diet alone.[7] The major role of thiamin in the body is as a component of co-enzymes that enable us to use amino acids (from protein) and carbohydrates for energy.

**Key benefits of thiamin supplementation:**

- Improved cardiovascular health
- Possible reduced risk of obesity and diabetes
- Improved energy provision

Thiamin deficiency could be part of the complex aetiology (causation) of developing heart disease later in life and early supplementation might reduce the risk of future cardiovascular events.[8] There is also evidence that thiamin and other B-vitamin deficiencies might be associated with obesity in both adults and children.[9,10] Children might be at greater risk of a marginal thiamin deficiency when sick and this deficiency appears to be correlated with inflammation.[11] A marginal deficiency of this vitamin has also been shown to reduce gross and fine motor skills (like those used in sports)[12] and infantile thiamin deficiency could also result in a form of epilepsy.[13]

**Why supplement with thiamin?**

A sub-clinical deficiency may exist for a large proportion of the population, including children, and supplementing with thiamin is prudent to ensure nutritional status and improve health and reduce future health-risk. Thiamin hydrochloride as a bioavailable and safe form for supplementation.

## Vitamin B2 – Riboflavin

**Form:**
Riboflavin
**Key body systems:**
Immune, circulatory, nervous
Riboflavin, or vitamin B2, is a B-vitamin found in high amounts in eggs, green vegetables, milk and other

dairy product, meat, mushrooms, and almonds. It is essential to preserve proper energy provision.

**Key benefits of riboflavin supplementation:**

- Reduced oxidative stress
- Energy provision for active kids
- Reduced migraines

In addition to its other actions, riboflavin is a relatively under-recognised anti-oxidant that can help reduce oxidative stress to the body.[14] It is extensively used and has demonstrated significant evidence for the treatment of migraine without significant adverse effects,[15] and is effective for reducing both the frequency and severity of migraines in children.[16]

**Why riboflavin**

Riboflavin is included to support the provision of energy for growing, active bodies and in a supportive (non-therapeutic) dosage, to support the neural, circulatory and antioxidant functions of the body.

## Vitamin B3 – Niacin

**Form:**
Nicotinamide
**Key body systems:**
Circulatory, nervous

Niacin, also known as Vitamin B3, is a water-soluble vitamin that has a wide range of functions in the body, including a role in converting carbohydrates into glucose, metabolising fats and proteins, and nervous system function.

**Key benefits of niacin supplementation:**

- May help prevent cardiovascular disease and associated events
- Improves blood lipids
- May reduce migraines and tension-type headaches
- May improve psychotic symptoms in those with a niacin-respondent subset of schizophrenia

Research suggests that niacin supplementation reduces cardiovascular disease events[17,18] via its HDL-elevating, antioxidant and anti-inflammatory properties.[19] Niacin supplementation in children has also shown this effect, reducing high cholesterol levels and fatty acid concentrations in the blood, while increasing growth hormone.[20,21]

**Why nicotinamide and nicotinic acid?**

High doses of niacin can cause flushing, nausea, and fainting,[22] so, a supportive and moderate dose is included in this formula. Nicotinamide is both well-absorbed and tolerated.

## Vitamin B5 – Pantothenic acid

**Form:**
Calcium D-pantothenate
**Key body systems:**
Overall support

Vitamin B5 or pantothenic acid is a water-soluble vitamin of the B-complex. It is an essential nutrient required to help metabolise proteins, carbohydrates, and fats. The name derives from the Greek *pantos* ('everywhere') as small amounts are found in almost all foods. Higher amounts are found in wholegrains, eggs, liver, and dried mushrooms.

**Key benefits of vitamin B5 supplementation:**

- To support nutrient sufficiency as part of the B-complex
- Provide support for energy production

Vitamin B5 is essential to produce co-enzyme A. Co-enzyme A (CoA) is required in approximately 4% of all known enzymes as a cofactor, mostly used in the liberation of energy from the food we eat. Vitamin B5 is essential to produce co-enzyme A.

**Why include vitamin B5**

Because of the relative ubiquity of vitamin B5 in food, a deficiency is rare and there is little evidence that high amounts from supplements offer any meaningful benefit to people of any age. However, in supportive doses, as part of the B-complex, pantothenic acid is important to produce energy in the body. Therefore, a small amount is included in this formula, from bio-available calcium D-pantothenate, to help preserve nutrient sufficiency.

## Vitamin B6 – Pyridoxines

**Form:**
Pyridoxine hydrochloride
**Key body systems:**
Circulatory, endocrine, reproductive
Vitamin B6 refers to a group of related chemicals

that are all interconvertible and are essential for the liberation of energy from amino acids, carbohydrates, and fats. Forms include pyridoxine, pyridoxine 5'-phosphate (P5P), pyridoxal, pyridoxal 5'-phosphate (PLP), pyridoxamine, and pyridoxamine 5'-phosphate (PMP).

**Key benefits of vitamin B6 supplementation:**

- Reduced risk of cardiovascular disease
- Possible improvements in mood and cognition
- Support for overall health and energy production

While most children are likely to get sufficient B6 from the diet, as they age a significant proportion of people (~20%) do not habitually consume enough B6 in their diets,[7] and due to the critical role of this vitamin, in concert with the other B-vitamins, supplementation is recommended.

In children, B6 supplementation (with magnesium) has demonstrated improvements in symptoms of hyperactivity and aggressiveness,[23] and symptoms associated with Autism spectrum disorder.[24]

There is a dose-dependent relationship between increased B6 intake and reduced cardiovascular risk,[25] and vascular damage resulting from diabetes and other sugar-related damage can begin early in life. Vitamin B6 supplementation with folate has been shown to reduce endothelial damage in children with type 1 diabetes.[26]

**Why pyridoxine hydrochloride**

The various forms of B6 are highly interconvertible. Pyridoxine hydrochloride is easily absorbed and offers a high yield of conversion to active forms of vitamin B6 (like PLP) in the body.

## Vitamin B7 – Biotin

**Form:**
Biotin
**Key body systems:**
Integumentary, immune

Biotin, or vitamin B7, is a water-soluble vitamin and a cofactor for five carboxylases that catalyse steps in the metabolism of fatty acids, glucose, and amino acids. Biotin also plays a role in histone modification, gene regulation, and cell signalling.[27,28]

**Key benefits of biotin supplementation:**

- Helps to modulate gene expression
- Aids metabolism of fats, carbohydrate and protein
- Improves the health of hair, skin and nails

Research suggests that biotin supplementation can reduce brittleness and improve the health of nails.[29] Biotin supplementation has also reduced triglyceride concentrations and improved lipid profiles in diabetic patients,[30] and in combination with chromium supplementation has improved glucose control in trial participants with diabetes.[31]

**Why biotin?**

Biotin is an important water-soluble vitamin that needs to be supplied to the body regularly. It is important for blood glucose regulation, gene expression, metabolism, and plays a particular role in the health of hair, skin and nails.

## Vitamin B9 – Folate

**Form:**
Calcium L-5 methyltetrahydrofolate (L-5MTHF)
**Key body systems:**
Circulatory, immune, endocrine

Folate is a B-vitamin (B9) necessary for the production and maintenance of new cells, DNA synthesis and RNA synthesis through methylation, and for preventing changes to DNA. It is especially important during periods of frequent cell division and growth, such as during childhood and pregnancy.

**Key benefits of folate supplementation:**

- Reduced homocysteine levels
- Improved pregnancy outcomes
- Reduced inflammation
- A significant benefit of the natural form vs synthetic

Folate is critical to health during growth and it also helps to reduce homocysteine, linked reduced heart disease risk later in life, and it helps improve glucose control in those with diabetes.[32,33] There has been a suggestion that folate supplementation could also reduce inflammation. A systematic review and meta-analysis including 10 randomised, controlled trials, suggested that folate can significantly reduce C-reactive protein (CRP), a key marker of systemic inflammation.[34]

**Why L-5-MTHF?**

It is important to use an active methylated form of folate; L-5-methyltetrahydrafolate (L-5-MTHF) in preference to the cheaper synthetic form often simply labelled 'folic acid'. Many people cannot effectively convert other synthetic forms of folic acid to active folate in the body. The common synthetic form of folic acid (pteroylmonoglutamate) found in most supplements leads to high levels of unmetabolised folic acid in the blood.[35,36] This can interfere with the function of active folate,[37,38] negatively affecting immunity.[39] Although it has been suggested that L-5-MTHF is less easily absorbed than synthetic folic acid, a recent systematic review has suggested that there is little difference between absorption rates of different forms of folic acid or folate, with the only studies reporting a significant difference showing greater bioavailability of the L-5-MTHF form.[40]

## Vitamin B12

**Form:**
Methylcobalamin
**Key body systems:**
Immune, circulatory, nervous

Vitamin 12, or cobalamin, is a water-soluble vitamin plays an essential role in folate metabolism and in the synthesis of succinyl-CoA, a citric acid intermediate. In addition, it is required, as methylcobalamin, for the function of the folate-dependent enzyme methionine synthase, which is required for the synthesis of the amino acid methionine from homocysteine. Vitamin B12 plays a key role in red blood cell production, brain health, and DNA synthesis. Intestinal malabsorption is generally the cause of vitamin B12 deficiency, as absorption of vitamin B12 from food requires stomach acid to free vitamin B12 from food.

**Key benefits of B12 supplementation**

- Reduced chronic pain
- Possible antioxidant properties
- Normalises serum vitamin B12 levels and deficiency
- Important for vegans and vegetarians to supplement with this vitamin

Vitamin B12 plays an important role in the preservation of the myelin sheath around neurons and for the synthesis of neurotransmitters. Oral vitamin B12 supplementation has been shown to normalise serum vitamin B12 levels and address the clinical manifestations related to vitamin B12 deficiency and is a cost-effective effective, more comfortable alternative to intramuscular vitamin B12.[47,42] Vitamin B12 may also possess antioxidant properties.[43] Anaemia is usually the first sign of a B12 deficiency, but not always, as high intakes of folates can mask B12 deficiency for some time. Of note is that the neural (brain and central nervous system) damage induced by a B12 deficiency is not reduced by folate and so it is imperative for vegans to take a B12 supplement.

Vitamin B12 deficiency (along with low levels of B6 and B9) have been observed in children with autism spectrum disorder,[44] attention deficit disorder,[45] and is also a reason for delayed brain development.[46] Supplementation with methylcobalamin has been demonstrated to improve symptoms of autism.[47]

**Why methylcobalamin?**

The common form added to supplements cyanocobalamin is a synthetic form not found in foods in nature. The metabolism of cyanocobalamin leaves behind a cyanide residue that the body must then excrete. This is unlikely to cause problems for most people as the amount of cyanide left is extremely small. However, those with pre-existing kidney problems may have trouble excreting even these small amounts and a methylcobalamin form is preferred.[48] Expert advice is to use a non-cyanide form of B12 for general safety.[49]

Methylcobalamin is a natural alternative to synthetic vitamin B12. Vitamin B12 regulates, together with 5-methyl-tetrahydrofolic acid (folate), the remethylation of homocysteine to l-methionine and the subsequent formation of S-adenosylmethionine (SAMe). SAMe is essential to most biological methylation reactions including the methylation of myelin, neurotransmitters and phospholipids (e.g., phosphatidylcholine). Methylcobalamin, having a methyl group is able to act as a methyl donor for these reactions,[50] whereas the synthetic forms need

to themselves be methylated in order to do this. This step may be limited in some people and even in healthy people taxes methylation pathways unnecessarily. Methylcobalamin is also absorbed more effectively than synthetic B12 (cyanocobalamin),[51] and has been demonstrated to alleviate B12 deficiency in children.[52]

## Vitamin C

**Form:**
L-ascorbic acid
**Key body systems:**
Immune, circulatory, integumentary

Vitamin C, or ascorbic acid, is a water-soluble essential vitamin that serves as both an antioxidant and pro-oxidant. This vitamin plays an instrumental role in the development and maintenance of tissues, bone formation, wound healing, immune function, and a number of metabolic functions.[53] Humans are unable to synthesise vitamin C, so ingestion from either an exogenous supplement or diet is necessary. Deficiency of vitamin C can lead to scurvy, anaemia, infections, bleeding gums, muscular degeneration, poor wound healing, and a number of other conditions.[53]

**Key benefits of vitamin C supplementation:**

- Antioxidant effects
- Connective tissue and joint health and repair
- Improved cardiovascular health and reduced blood pressure
- Improved immunity
- Reduction in severity of colds

Research suggests that vitamin C supplementation can support healthy connective and bone tissue (via collagen formation). Vitamin C's antioxidant roles are many, and it has been shown to prevent free radical damage, reduce asthmatic symptoms, and supplementation may be protective against stroke,[54] heart attacks, neurodegenerative decline and related disorders.[55] Vitamin C might also be of benefit for the prevention of certain cancers of the lung, breast, and bladder,[56-59] and it has been shown to enhance the immune system and protect the body from a number of diseases by stimulating the activity of antibodies.[58] Increased vitamin C intake, vitamin C supplementation, and higher concentrations of vitamin C are associated with lower blood pressure.[60] Vitamin C supplementation has been shown to significantly reduce serum uric acid and may play a role in reducing hyperuricaemia and help to prevent gout.[61] Vitamin C dosages of greater than 500mg/day have been associated with beneficial effects on endothelial function, particularly in those with cardio-metabolic disorders.[62]

While vitamin C, contrary to popular belief, probably won't cure the common cold, reviews research show that it might help to reduce symptoms of colds and shorten their duration,[63] and might even help to prevent the occurrence of colds in athletes and others prone to higher levels of stress when taken regularly.[64,65] In children, a lower intake of vitamin C has been linked to an increased risk of asthma and wheezing.[66]

**Why L-ascorbic acid?**

Vitamin C is ascorbic acid. This is the bio-identical form of vitamin C and when combined with citrus bioflavonoids and other secondary antioxidants in the formula, provides a natural antioxidant complex.

## Vitamin D

**Form:**
Cholecalciferol (vitamin D3) from lichen
**Key body systems:**
Skeletal, integumentary, immune, endocrine, muscular

Vitamin D is a group of fat-soluble steroid-like compounds important for calcium absorption and bone mineralisation, mood, immune function, and modulating immunity amongst other functions. The major source of vitamin D is endogenous (within the body) production in the skin as a result of exposure to the UV rays in sunlight. However, due to geographic and seasonal variation in sun exposure and genetic differences in vitamin D production in response to sunlight, supplementation and food derived sources have been considered important for preserving health.

**Key benefits of Vitamin D supplementation**

- Reduced depression
- Possible improvements in respiratory function
- Increased muscle strength
- Reduced incidence of immune disorders
- Improved bone and systemic health

Vitamin D supplementation might help to reduce depression in those with significant depression.[67] Vitamin D might also reduce exacerbations of asthma in children.[68] In two reviews of the available research, vitamin D at between 600 and 5000iu per day was found to improve muscular strength.[69,70] Vitamin D supplementation is showing promise for follicular development and menstrual regulation in women with polycystic ovary syndrome.[71] It is also showing promise for inhibiting relapse in rheumatoid arthritis and systemic lupus erythematosus.[72] Vitamin D supplementation during pregnancy is significantly associated with improved birth weights and reduced neonatal and foetal mortality.[73] Obesity reduces vitamin D absorption in a linear fashion and so, those with higher bodyweights might benefit even more from supplementation.[74]

In children, a higher blood level of vitamin D is associated with improved lipid markers (risk factors for later cardiovascular disease),[75] lower respiratory infections,[76] reduced inflammation,[77] and vitamin D status is also associated with risk of asthma,[78] with possible benefits resulting from supplementation.[79]

**Why cholecalciferol from lichen?**

Vitamin D3 (cholecalciferol) is the natural form found in and created by animals (including humans) compared to the fungi-derived vitamin D2 (ergocalciferol). There is epidemiological evidence that vitamin D3 promotes better health outcomes than D2. Vitamin D3 supplements have typically been extracted from the lanolin of sheep wool and are therefore not vegan. In this formula we have included natural vitamin D3, bioidentical to that within the human body, sourced from lichen to ensure that the product can be used by vegans.

## Vitamin E

**Form:**

d-alpha tocopherol acetate and mixed natural tocopherols and tocotrienols

**Key body systems:**

Circulatory, immune, endocrine, nervous

The vitamin E group includes eight fat-soluble vitamins; alpha, beta, gamma, and delta tocopherols and tocotrienols. Vitamin E deficiency, typically caused by malabsorption generally, or problems with fat absorption, can result in nervous system problems. Vitamin E is a key antioxidant and is thought to play an important role in gene expression. Sources include most dietary fats, including oils, nuts and seeds, and the fat of meat, fish, eggs and dairy.

**Key benefits of vitamin E supplementation:**

- Supports cardiovascular health
- Improved blood sugar control in those with metabolic disorder
- Anti-inflammatory and analgesic properties

Populations who consume larger amounts of vitamin E in food have been linked to reduced rates of cardiovascular and other diseases and *in vitro* research has demonstrated the antioxidant and anti-ageing properties of vitamin E. However, studies using supplementation of vitamin E have yielded mixed or even negative results, possibly due to the conflicting forms used (i.e. the various forms of tocopherols and tocotrienols) or lack of combination with other essential nutrients creating an 'imbalanced' nutritive effect, [80,82] and possibly due, in part to statistical methods used. [83] Pooled data from randomised controlled trials also show a significant, positive effect of vitamin E supplementation on endothelial function (the thin membrane that lines the inside of blood vessels and which can become damaged and is a contributor to heart disease). This effect is greatest for those with lower levels of vitamin E.[84] Supplementation with vitamin E also significantly reduces systolic blood pressure (WMD = −3.40 mmHg, 95% CI = −6.70 to

−0.11, P < 0.001) with no significant effect on either diastolic or mean arterial pressure.[85]

While no overall effect of vitamin E supplements improving blood-sugar control has been observed, better glucose control (reductions in HbA1c) has been demonstrated in those with severely elevated blood glucose (HbA1c ≥ 64),[86] and on balance, it appears that there is reduced hospitalisation and cardiovascular mortality for those people with diabetes taking vitamin E supplements.[87]

Vitamin E supplementation might be useful as an adjunctive to reduce head and neck cancers,[88] to reduce the reduce risk of asthma in children when taken during pregnancy,[89] and to relieve osteoarthritis[90] possibly due to its anti-inflammatory and immunomodulatory effects.

In children, vitamin E intake supplementation is thought to reduce the risk of asthma and it has been found that supplementation during pregnancy is likely to affect the risk of childhood asthma.[89,90]

**Why d-alpha tocopherol and mixed natural tocopherols and -trienols?**

While alpha-tocopherol has been considered the 'active' vitamin E and is very important for health, all of the vitamin E family have benefits to human function. For example, alpha and gamma tocopherols provide contrasting and complementary actions for immune and inflammatory modulation.[93] Gamma has also been shown to be a more effective free-radical scavenger and excessive amounts of alpha-tocopherol might inhibit these effects.[94] For balance of our innate immune, inflammatory and antioxidant pathways, we have included a mixed vitamin E blend.

## Vitamin K

**Form:**
K1 (phylloquinone) and K2 MK-7 (menaquinone-7)
**Key body systems:**
Immune, endocrine, circulatory, skeletal

Vitamin K is a fat-soluble vitamin that plays a role in clot formation, bone metabolism, modulation of inflammation and immunity, and regulation of various cellular functions.

**Key benefits of vitamin K supplementation:**

- Reduces vascular calcification, a marker for vascular health associated with cardiovascular events
- May improve insulin sensitivity
- May improve glucose tolerance
- Improves anticoagulation control in those on vitamin K antagonists (VKAs)
- Reduces bone loss

Research suggests that vitamin K supplementation significantly reduces vascular calcification, which is a marker for vascular health associated with cardiovascular events.[95] In addition, there is evidence to show that vitamin K may help manage insulin sensitivity and glucose tolerance.[96] While these are seen as being 'adult' health events, nutrient sufficiency earlier in life is important for reducing later risk, and metabolic syndrome and type 2 diabetes are being seen earlier and earlier in life. Supplementation with both the more common vitamin K1 (found abundantly in vegetables) and the less prevalent forms of vitamin K2, reduce bone loss and may assist in reducing the incidence of bone fractures.[97,98]

**Why K1 and K2 MK-7?**

Vitamin K1 is more commonly found in the diet from vegetables but may be lacking in diets that are lower in high-quality nutrient-dense plant foods. Vitamin K2 MK-7 (menaquinone 7) is less common in the diet, coming from fermented foods such as natto. Vitamin K2 MK-7 is more stable, has a longer half-life, and is likely to have a greater effect on bone quality than K1,[99] and reduces both arterial calcification and stiffness,[100] not always observed with K1 supplementation, but both have significant and complementary benefits to health. MK-7 supplements have specifically demonstrated the ability to reduce bone loss in older women.[101]

## MINERALS

### Calcium

**See:** Red Marine Algae

### Chromium

**Form:**
Chromium picolinate
**Key body systems:**
Endocrine

Chromium is a trace mineral that appears to play an important role in enhancing the action of insulin and thus, blood sugar regulation, as well as being directly involved in carbohydrate, fat and protein metabolism.

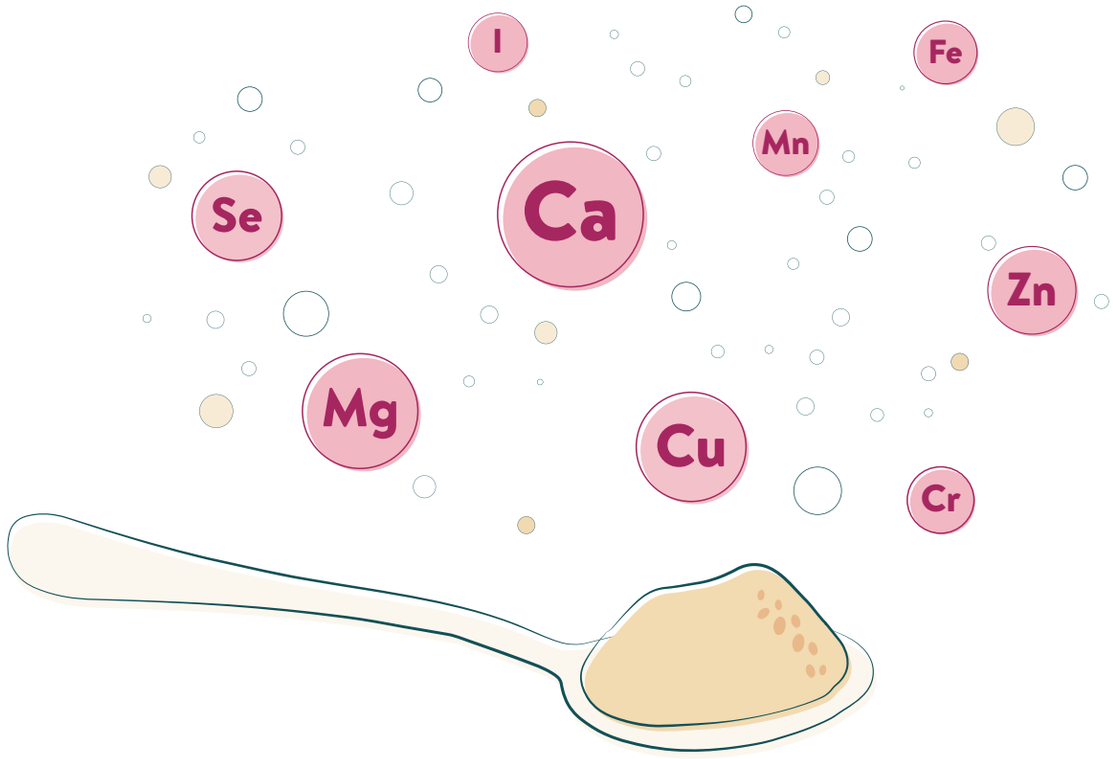
**Key benefits of chromium supplementation:**

- Improves insulin function
- May improve triglycerides and HDL cholesterol
- Improves BMI
- Improves free testosterone levels in PCOS patients

Research shows that chromium supplementation (specifically chromium picolinate) significantly reduces hyperglycaemia and hyperinsulinaemia (high blood sugar and blood insulin levels respectively) in people with diabetes.[102-104] It may also improve triglycerides and HDL-c levels,[105] and has also been shown to have positive effects on oxidative stress, lipid profile, protein synthesis, binge eating disorder, and cognitive decline.[106] Chromium supplementation has also been shown to significantly improve BMI,[107] and improve testosterone levels in patients with polycystic ovary syndrome (PCOS).[108]

**Why chromium picolinate?**

Chromium picolinate is the most studied form of chromium and is considered well-absorbed, safe at supplemental doses, and effective.



## Copper

**Form:**
Copper gluconate
**Key body systems:**
Immune, circulatory, nervous, skeletal

Copper is a mineral (Cu) that has a long history of use in its directly usable form (most commonly from blue-green copper salts) as one of the oldest materials for weapons, jewellery, and for industrial and anti-microbial applications. As a nutrient it is one of the essential minerals that must be supplied by the diet. It aids iron uptake and a deficiency can produce anaemia-like symptoms, neutropaenia, bone abnormalities, impaired growth, increased incidence of infections, osteoporosis, hyperthyroidism, and abnormalities in glucose and cholesterol metabolism.

**Key benefits of copper supplementation:**

- Reduced oxidative stress
- Reduced triglycerides
- Neuroprotective
- Important in pregnancy
- Support of bone health

Minerals can compete for absorption, especially at the divalent mineral transporter (DMT). Zinc can compete with copper and so, excessive or prolonged supplementation with zinc can reduce availability of copper. Therefore, it is important to supplement with copper if supplementing with zinc. However, the upper limit that has been set for zinc, primarily to avoid a secondary copper deficiency, may be too low. In evaluations of elderly patients,[109] boys taking 5-15mg of zinc per day, with a relatively zinc-rich diet, infants taking 10mg per day for four months, and healthy, adult men taking 30mg of zinc per day,[110] there was no effect observed on total body copper status.[111,112] A higher dose of 22mg per day for 30 days did reduce copper levels in athletes and might reduce glucose utilisation.[113] Similarly, dosages between 15 and 50mg of zinc gluconate per day significantly reduced copper levels in adults.[114,115] High ascorbic acid (vitamin C) intakes are also likely to inhibit copper status.[116]

Note: Copper and iron supplementation do not appear to reduce the availability of either nutrient.[117] The modern diet is assumed to be sufficient in copper because of its ubiquitous availability in food but research has demonstrated that there might be a marginal (sub-clinical) deficiency in 38% of hyperlipidaemic patients (with high blood triglyceride and cholesterol levels). Supplementation with copper at ~5mg per day improved cholesterol, LDL, HDL, and especially triglycerides.[118,119]

Copper is also involved in antioxidant enzyme activities and supplementation in those with lower copper status improves levels of superoxide dismutase (SOD) and diamine oxidase (DAO).[120]

Copper deficiency can present similarly to the neural effects (myeloneuropathy) seen in a B12 deficiency and this has been reversed with copper supplementation.[121] Those with cystic fibrosis might also be at greater risk of a copper deficiency.[122] Copper supplementation also appears to reduce age-related bone mineral loss.[123]

**Why copper gluconate?**

Copper is included to help provide copper sufficiency, especially in relation to possible antagonists like zinc and vitamin C, and therefore to ensure balance within the systems of the body. The gluconate form is included as a soluble, easily absorbable form of this mineral.

## Iodine

**See:** Kelp

## Magnesium

**Form:**
Magnesium citrate
**Key body systems:**
Circulatory, endocrine, nervous, muscular, skeletal

Magnesium is a very important, essential mineral for the human body. More than 300 enzymes require magnesium ions for their actions, including all enzymes

using or synthesizing adenosine triphosphate (ATP) and those that use other nucleotides to synthesize DNA and RNA. The energy providing molecule of the body (ATP) is normally found as magnesium-ATP. Many people eating a modern 'American-style' diet do not consume enough magnesium and have low serum magnesium levels. Research from the US suggests that almost half of the population do not consume the required daily amount of magnesium from food.[124] Magnesium is found in high amounts in spices, nuts and seeds, cereals, cocoa and vegetables.

**Key benefits of magnesium supplementation:**

- Supports heart and circulatory health
- Supports healthy blood sugar regulation
- Relaxing and anti-anxiety
- Might improve strength in some populations

Magnesium status is important for preserving cardiac rhythm and supplements appear to reduce arrhythmia and improve endothelial function.[125,126] Magnesium is involved with blood glucose regulation and while the research is equivocal in those without diabetes, people with metabolic syndrome and diabetes might achieve positive changes in blood glucose, insulin levels, and HDL and LDL cholesterol, and triglycerides from magnesium supplementation.[127,130] Magnesium works in concert with calcium to regulate nerve firing and reduces over-excitation of the nervous system, thus, supplementation might help to reduce anxiety.[131] Magnesium supplementation is likely to improve strength in those with low dietary intakes and poor magnesium status.[132]

Additionally, low blood and tissue magnesium levels have been found in studies of children with attention-deficit, hyperactivity disorder (ADHD).[133]

**Why magnesium citrate?**

Magnesium citrate is both soluble and highly absorbable and is a preferred form of magnesium for both supportive and therapeutic use.[134]

## Manganese

**Form:**
Manganese gluconate
**Key body systems:**
Immune, endocrine

Manganese is an essential mineral. It is involved in macronutrient metabolism, bone formation and a co-enzyme and in free radical defence. Manganese is found in water, and many foods, from shellfish, through to many nuts, legumes, fruits and vegetables, and tubers, and deficiency is extremely rare.

**Key benefits of manganese supplementation:**

- Support of overall health, metabolism and antioxidant status

Manganese is an essential mineral and in association with all the other micro- and macronutrients, supports optimal health. While rare, a deficiency of manganese could result in poorer bone health and poor growth in children; skin rash, mood disturbance and problems with macronutrient metabolism.

**Why manganese gluconate?**

Manganese is an essential mineral and in association with all the other micro- and macronutrients, supports optimal health. While rare, a deficiency of manganese could result in poorer bone health and poor growth in children; skin rash, mood disturbance and problems with macronutrient metabolism.

## Phosphorous

**See:** Potassium (form used is potassium phosphate)

## Potassium

**Form:**
Potassium phosphate
**Key body systems:**
Circulatory, skeletal, muscular, nervous

Potassium is an electrolyte and the major cation in the intracellular fluid. It plays an important role in maintaining homeostasis in conjunction with sodium. Potassium is essential for normal cell, nerve, and muscular function.

**Key benefits of potassium supplementation:**

- Reduced blood pressure
- Improved circulatory health
- Supports bone health

Research suggests that oral potassium supplementation can help the body to properly

regulate blood pressure.[135-138] Supplemental potassium has also been shown to lower urinary calcium excretion and reduce bone resorption, indicating a benefit to bone growth and development.[139]

**Why potassium phosphate?**

Several forms of supplemental phosphate appear to be well absorbed. Potassium phosphate also supplies phosphorus, important for the structure of RNA, DNA and bone tissue (as calcium phosphate). Potassium phosphate (in high doses of around 4000 mg) has also been demonstrated to help reduce perceived exertion during exercise.[140]

## Selenium

**Form:**
L-selenomethionine
**Key body systems:**
Immune, endocrine

Selenium is a non-metal essential mineral. It is a component of the antioxidant enzymes glutathione peroxidase and thioredoxin reductase and is a component of deiodinase enzymes which convert T4 (thyroxine) to the active thyroid hormone T3 (triiodothyronine). Selenium is required in small amounts but many soils (like those in New Zealand) are sparse in selenium. Brazil nuts are a good source of this mineral.

**Key benefits of selenium supplementation:**

- Supports overall health (sparse in the soils and foods of many regions)
- Supports thyroid function
- Immune benefits
- Reduced inflammation and oxidation

There is an association between selenium intake and status and reductions in prostate cancer,[141-142] and breast cancer risk.[143] There might also be a benefit for lung cancer risk for those with low selenium status but an increased risk from supplementation in those with high selenium status.[144] Lower selenium concentration is also associated with gestational diabetes.[145] Selenium supplementation results in significant reductions in thyroid peroxidase and thyroglobulin autoantibodies in people with Hashimoto's thyroiditis.[146,147] However, some of the studies reviewed may suffer from bias.[148] Selenium supplements might also reduce mortality in those hospitalised with sepsis.[149]

Selenium supplementation reduces C-reactive protein (a key marker of inflammation) and increases glutathione peroxidase, a key antioxidant enzyme, without concurrent reductions in cardiovascular mortality or improvements in lipid status, with the possible exception of marginal improvements in triglycerides and V-LDL.[150,151]

**Why L-selenomethionine**

L-selenomethionine is an amino acid containing selenium and the amino methionine. It is the naturally occurring form of selenium found in Brazil nuts and other plant foods and is more easily absorbed than the inorganic mineral form of selenium, *selenite.*

## Zinc

**Form:**
Zinc citrate
**Key body systems:**
Immune, endocrine, circulatory, digestive, muscular, nervous

Zinc is an essential mineral that is required for the function of hundreds of enzymes and thousands of transcription factors in the body. It is the second most abundant trace metal in humans after iron and the only metal which appears in all enzyme classes. Because of the relative abundance of zinc and its use in so many enzyme reactions, zinc is essential to metabolism, RNA and DNA creation, cell signalling, immune function, and gene expression.

**Key benefits of zinc supplementation:**

- Improved metabolic status
- Improved heart and circulatory health
- Improved immunity
- Reduced depression

Zinc status is often low in those with metabolic syndrome and zinc has been shown to reduce fasting and post-meal glucose, fasting insulin, HbA1c, and C-reactive protein (CRP),[152] and improves insulin resistance in both men and women.[153]

Zinc supplementation also significantly reduce triglycerides, cholesterol and LDL cholesterol.[154] Despite methodological limitations, the evidence trends towards zinc supplementation improving depression with or without pharmaceutical treatment.[155]

Zinc supplementation helps to reduce childhood diarrhoea and is especially important for reducing this in children less than six months of age, and in developing nations where diarrhoeal infections are common, and zinc status may not be optimal.[133,156]

Zinc supplements might improve body composition (lean mass vs fat mass),[157] and growth in children,[158] especially in those failing to grow at normal rates, and could also improve cognition in children.[159]

**Why zinc citrate?**

Zinc citrate is considered one of, if not the most absorbable forms of zinc, with absorption rates demonstrated greater than 61% (higher than both gluconate and oxide).[160]

## IMMUNE AND NEURAL BLEND

### Protein

**Form:**
Pea Protein Isolate from *Pisum sativum*
**Key body systems:**
Muscular, skeletal, circulatory, integumentary

The amino acids which make up protein are the building blocks for all cells, tissue and organs in the body. Having an optimal protein intake is essential to sustain and improve health and performance.

**Key benefits of protein supplementation:**

- Improved lean muscle
- Improved bone health
- Increased satiety
- Improved cardiovascular health

As the building block of all tissue, it's not surprising that it offers a broad range of benefits. In fact, protein supplements are associated with lower hospital admissions and fewer health complications.[161] Higher protein intakes are also good for 'cardiometabolic' health and increased dietary protein has a small, beneficial effect on blood pressure, reduces triglycerides (one of the most important markers of poor cardiovascular and metabolic health), and reduces body fat stores.[162,163]

Protein is also crucial to help preserve or grow muscle mass, reduce fat, reduce soreness from exercise, and support strength and power development, and the growth and development of bones.[164-167]

Similarly to adults, children may benefit from post-exercise protein supplementation.[168] Low protein intakes are also associated with poor health outcomes for critically ill children and intakes greater than 1.5 g per kg of body weight are suggested.[169]

**Why pea protein isolate?**

Pea protein isolate is included as a vegan, gluten-, soy-, and dairy-free option, free-from common allergens and gastric irritants and antinutrients (like lectins and phytic acid). Pea protein isolate contains all the essential amino acids needed for human growth and development and compares very favourably with the recommended amino acid pattern proposed by the Institute of Medicine of the United States National Institutes of Health.[170] It boasts an absorption rate over 89%,[171] and in a head-to-head trial performed equally well for muscle growth and retention as the previous 'gold-standard', whey protein.[172] Many children are allergic to various proteins, including commonly used dairy proteins,[173] and pea protein isolate offers a low-allergen option for supplementation.

### Lecithin

**Form:**
Sunflower lecithin from *Helianthus Annuus*
**Key body systems:**
Nervous, muscular

Lecithin contains phospholipids such as phosphatidylserine, phosphatidylcholine, and phosphatidylinositol (PI), substances that help form the cell-membrane and provide choline, a precursor

of acetylcholine and major neurotransmitter (a chemical 'signal' between cells). Lecithin supports the healthy development of all cells, especially cells of the brain and central nervous system and aids the production of acetylcholine.

**Key benefits of lecithin supplementation:**

- Improved cardiovascular health
- Reduced stress

Studies have demonstrated fairly significant results from relatively small doses of lecithin (~500mg). In one study, 500mg per day resulted in reductions of cholesterol (42%) and LDL cholesterol (56%) after two months.[174] A complex of phosphatidic acid and phosphatidylserine from lecithin have also been shown to reduce both cortisol and survey responses to stress.[175]

**Why sunflower lecithin?**

While soy lecithin is the most common form available, sunflower lecithin provides high levels of phospholipids and is a useful alternative for those suffering from a soy intolerance or allergy.

## Flaxseed

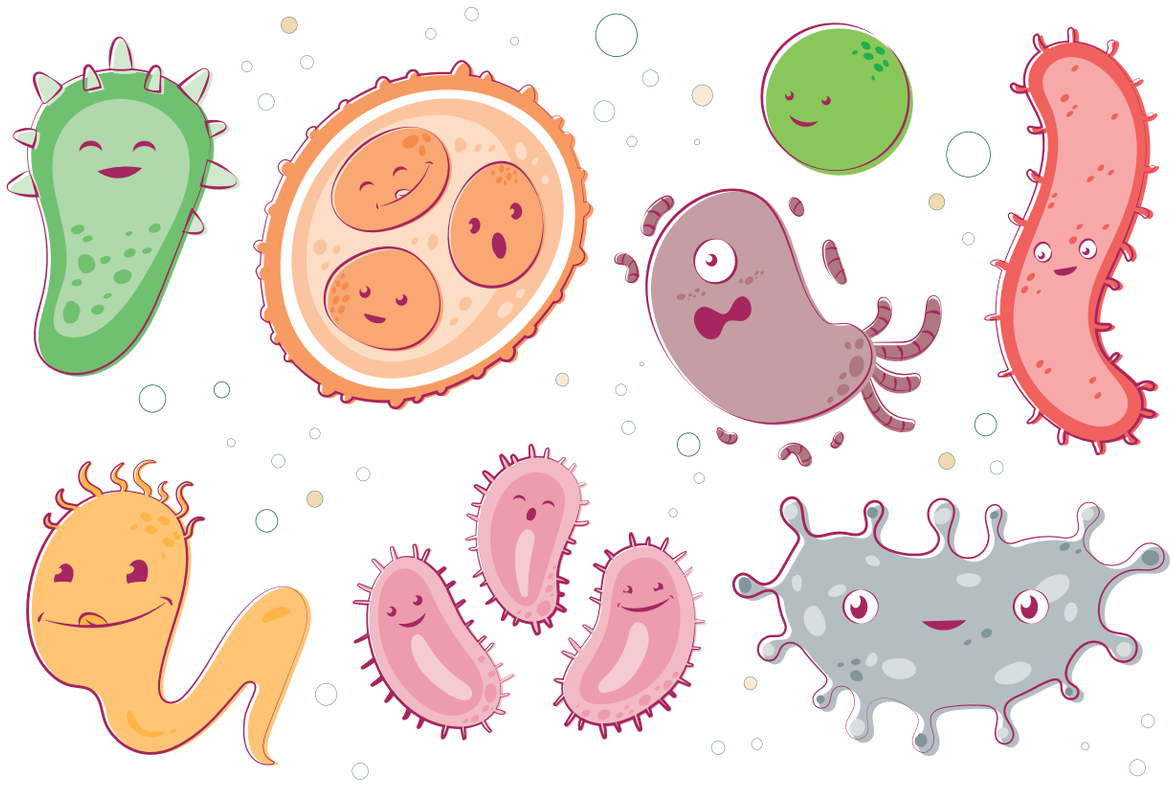
**Form:**
Organic whole ground seed from *Linum usitatissimum*
**Key body systems:**
Circulatory, immune

Flaxseed contains a range of health-promoting compounds including lignans, other phytochemicals and omega-3 fatty acids.

**Key benefits of flaxseed supplementation:**

- Improved cardiovascular health
- Improved metabolic health

Flaxseed supplementation is considered to be beneficial for the cardiovascular system. Systematic reviews and meta-analyses have shown significant reductions in blood pressure *with flaxseed*



*supplementation.*[176-177] Other research suggests that flaxseed supplementation might help people to reduce weight and improve body-composition (lean vs fat mass).[178] Flaxseeds also help to regulate blood-sugar balance with reductions in blood-glucose, insulin and insulin resistance models in those consuming supplemental flaxseed.[179]

**Why organic flaxseed?**

While some of the benefits seen in studies are with relatively large doses of flaxseed (≥30g/day), we see organic flaxseeds as a valuable addition to the formula as part of a complex of wholefood derived, nutrient-dense foods. They contain valuable antioxidant lignans and the 'base' omega-3 fatty acid alpha-linolenic acid, suitable for vegans, from which the body produces active metabolites that help to combat excess inflammation and help to modulate immunity.

## Bioflavonoids

**Form:**
Mixed bioflavonoid citrus extract
**Key body systems:**
Circulatory, immune, respiratory, digestive, nervous

Bioflavonoids are naturally occurring compounds found in many plant and fungi foods. They are considered to be antioxidants and have a range of health benefits.

**Key benefits of bioflavonoid supplementation:**

- Improved cardiovascular health
- Improved respiratory health
- Reduced inflammation and oxidation
- Improved cognition
- Improved eye health

Foods high in bioflavonoids like citrus, tea, coffee, red wine, pomegranate, and chocolate, are considered to be beneficial to overall health, and have also been shown to reduce inflammation and oxidation.[180] Reviews of observational studies suggest that increased bioflavonoid intake reduces the risk of cardiovascular disease, cardiovascular disease mortality, all-cause mortality,[181-183] incidence of upper-respiratory tract infections,[184] and might also have a protective effect against lung and gastric cancers.[185,186] Preliminary evidence also suggests that bioflavonoids can help to improve cognition and memory,[187] as well as reduce vision loss, and improve effects of the eye disease glaucoma.[188]

**Why mixed bioflavonoids?**

Different bioflavonoids have slightly different actions and so, by providing a spectrum of flavonoid compounds, there is the optimal opportunity to support the body's overall health. The evidence suggests that taking wholefood derived bioflavonoid complexes, like those you get in food, is superior to taking isolated flavonoids.

## Grapeseed

**Form:**
Extract from seeds of *Vitis Vinifera*
**Key body systems:**
Circulatory, immune, reproductive

Grapeseeds contain antioxidant and anti-inflammatory compounds, especially proanthocyanidins and procyanidins.

**Key benefits of grapeseed extract supplementation:**

- Improved cardiovascular health
- Increased antioxidant activity
- Reduced oxidation and inflammation
- Improved reproductive health

Grapeseed extracts contain antioxidants that increase the total antioxidant activity of the body,[189] with a range of purported health benefits. In a study of 150 and 300mg of grapeseed extract vs placebo, over 4 weeks, there was a significant reduction in blood pressure.[190] A meta-analysis of studies up to 2011 confirmed this, with consistent, significant reductions in systolic blood pressure and heart rate.[191] Grapeseed extract also improves blood-flow and reduces oxidative damage to the cardiovascular system,[192] and might reduce leg swelling.[193] 75 mg of grapeseed extract has been demonstrated to increase glutathione (a key antioxidant) concentration and reduce C-reactive protein (CRP - a marker of total body inflammation) in people with type 2 diabetes.[194]

**Why grapeseed extract?**

Extracts allow for higher quantities of the beneficial, naturally derived proanthocyanidins and procyanidins and other beneficial phytochemicals to be included in the product.

## Beta-glucans

**Form:**
1,3/1,6 beta-glucans
**Key body systems:**
Endocrine, circulatory, integumentary

Beta-glucans are a group of polysaccharides (long-chain carbohydrates) found in a wide variety of foods in small amounts, including cereal grains like oats, bacteria, and commonly taken in the diet through edible and medicinal mushrooms. Beta-glucans are considered to be butyrogenic prebiotic fermentable fibres with applications for gut-health and oat and barley glucans have been linked to improved cholesterol profiles.

**Key benefits of beta-glucan supplementation:**

- Reduced blood lipids
- Possibly anti-diabetic
- Anti-ageing

Beta-glucans have demonstrated the ability to reduce blood glucose from either high doses (~6g per day) or longer-term use of lower doses.[195] They can also reduce both total and LDL cholesterol, improving blood lipid profiles.[196,197] Beta-glucans have also been suggested as being beneficial to anti-wrinkle, anti-ageing and wound healing.[198]

## Apple pectin

**Form:**
Pectin fibre from the fruit of *Malus pumila*
**Key body systems:**
Circulatory, digestive, immune

Pectin is a type of polysaccharide prebiotic fibre found in the cell walls of various plants and in their various fruits. Pectin has been used in various foods to improve 'mouth feel', consistency, and gelling and has been researched for its benefits to the digestive tract.

**Key benefits of apple pectin supplementation:**

- Reduced cholesterol levels
- Improved gut health
- Improved assimilation of nutrients

Much of the research in the potential medicinal use of pectin has been done in animals for the potential to aid gut-related disorders, including cancers. Apple pectin in particular (as compared to citrus pectin) has shown benefits in both animal and human models for improved bacterial status and increased production of beneficial short-chain fatty acids in the colon,[199,200] and reduced incidence of colon tumours.[201] Pectin also results in reduced total cholesterol, LDL-cholesterol, triglycerides, and might have anti-obesity effects.[202,203] Changes in the guts of laboratory animals from apple pectin supplementation have also been shown to increase the bioavailability of quercetin, an antioxidant bioflavonoid,[204,205] with the suggestion that apple pectin may help improve overall nutriment and health.

In children, a combination of the herb chamomile with apple pectin resulted in significant improvements in the duration of diarrhoea when compared to placebo.[206]

**Why apple pectin prebiotic?**

Apple pectin is considered a 'gentle' prebiotic that, anecdotally, doesn't result in gastric disturbance when compared to some other fibres. It has also demonstrated superior results for improving bacteria status when compared to other pectins.

## Psyllium husk

**Form:**
Fibre from the husk of the seeds of *Plantago psyllium*
**Key body systems:**
Circulatory, digestive, endocrine

**Key benefits of psyllium husk supplementation:**

- Reduced cholesterol levels
- Improved gut health
- Improved blood-sugar responses
- Increased satiety (satisfaction and feeling of 'fullness' after eating)

It is well known that dietary fibre of various types is beneficial for gut health. Psyllium specifically is known to reduce constipation, has anti-diabetic and cholesterol-lowering properties and is associated with reduced rates of colon cancer.[207] Reviews of the many studies that have been conducted on psyllium specifically show that it can help to reduce total and LDL cholesterol, apolipoprotein B, along with improving blood-sugar responses and increases satiety.[208,210]

**Why apple psyllium husk?**

The husk of the psyllium plant contains the polysaccharide fibres that are beneficial to the gut and for systemic health.

## Dandelion

**Form:**
Extract from the leaves and roots of *Taraxacum officinale*
**Key body systems:**
Digestive, immune

Dandelions encompass several members of the *Taraxacum* family found originally in Eurasia and North America and now found throughout the world as wildflowers. They are a nutritious herb-vegetable and the whole plant has been used as a food for millennia. It has also been used traditionally as medicine in European, Asian, and Native American medicine systems. Its traditional use has mostly been as a liver and kidney protective, anti-inflammatory, and diuretic.

**Key benefits of dandelion supplementation:**

- Antioxidant and anti-inflammatory
- A highly nutritive herb likely to benefit all body systems

Dandelion has a long history of medicinal use and is known to be a very nutritive plant with diuretic properties. Ongoing research suggests that dandelion may also have anti-inflammatory, antioxidant, and potential anti-cancer applications which demand additional research,[211,212] and in addition, it may have prebiotic and anti-coagulator effects.[213]

**Why whole-plant dandelion extract?**

There is a range of beneficial compounds in dandelion that is thought to exert both nutritive and medicinal value. Traditionally it was thought that the combination of both roots and leaves gave the best overall benefit, especially for the kidney and liver.

## Ginger

**Form:**
Extract from the rhizome of *Zingiber officinale*
**Key body systems:**
Digestive, immune, endocrine, reproductive

Ginger has been widely used as a spice and medicinal herb by people throughout the world. Originating in South Asia, ginger was transported through the Asia-Pacific region and via the spice trade to ancient Europe. It has traditionally been used to reduce nausea and as a digestive tonic.

**Key benefits of ginger supplementation:**

- Antioxidant and anti-inflammatory
- Reduced nausea
- Improved mentrual regularity
- Improved blood lipid profiles
- Improved blood-sugar control
- Possible improvements body-compositioin

The main role for which ginger is known is for reducing nausea. Reviews of the literature show that ginger is effective for this purpose (at around 1500 mg per day in divided doses).[214] Preliminary evidence suggests that ginger is effective for reducing nausea and vomiting in children.[215]

Ginger has known antioxidant, anti-inflammatory, and anti-tumour effects and these along with the actions of various compounds in ginger that modulate tumour suppressor genes, cell cycle, apoptosis, transcription factors, angiogenesis and growth factors, is being considered as an adjunct for cancer treatment.[216,217] In addition, the anti-inflammatory, antioxidant and

immune effects have suggested ginger as a promising treatment for multiple sclerosis treatment.[218]
Ginger is also likely to hold anti-diabetic properties by improving insulin sensitivity, reducing blood glucose, increasing HDL-cholesterol, reducing LDL-cholesterol, reducing triglycerides and weight and BMI,[219-223] and reducing the inflammatory marker C-reactive protein (CRP).[224]

Ginger could also be used to help reduce damage resulting from radiation and chemotherapies and from chemical toxicity from drugs, or environmental pollutants.[225] It is also effective for reducing nausea and vomiting resulting from chemotherapy treatment.[226]

Data suggest that ginger could accelerate recovery of maximal strength after exercise and reduce the inflammatory response to cardiorespiratory exercise.[227]

**Why ginger rhizome extract?**

The root-like rhizome contains the active compounds in ginger and a high-quality extract is used to provide these to the formula.

## Digestive enzymes

**Form:**
*Bromelain* derived from the stems of *Ananus comsus*
**Key body systems:**
Digestive, immune, circulatory, integumentary

Pineapples and other tropical fruit have long been considered digestive aids in traditional medicine systems. Bromelain is now thought to aid protein digestion and be anti-inflammatory.

**Key benefits of bromelain supplementation:**

- Antioxidant and anti-inflammatory
- Improved immunity
- Reduced pain
- Improved wound-healing
- Improved cardiovascular health

Bromelain is now being studied for a range of health effects. It is considered to inhibit platelet aggregation, be anti-inflammatory and anti-tumour, and improve immunity and digestive. It may also enhance wound-healing and provide cardiovascular benefits.[228,229]

The existing evidence suggests that bromelain can improve symptoms of osteoarthritis[230] and reduce post-operative pain.[231]

**Why bromelain from pineapple?**

The stem of the pineapple plant contains the highest concentration of complex of enzymatic compounds known as 'bromelain'. These have a long history of use for digestive and other health benefits and are now being extensively studied.

## Probiotics

**Form:**
*Lactobacillus acidophilus* and *Bifidobacteria lactis*
**Key body systems:**
Digestive, endocrine, circulatory, immune

Lactobacillus and Bifidobacteria are naturally occurring bacteria in nature, fermented foods, and in as part of the human microbiome of the gut. They are essential for the proper regulation of digestion, absorption, resistance to endotoxicity, and to immunity and resistance to illness.

**Key benefits of probiotic supplementation:**

- Anti-inflammatory and antioxidant
- Improved gut-health (reduced diarrhoea, constipated, IBS, IBDs)
- Improved cardiovascular health
- Reduced risk of diabetes
- Possible improvement in body-composition
- Improved immune function

Reviews of the scientific literature show a range of benefits from probiotic supplementation including for reducing diarrhoea, gastrointestinal pain and bloating, and symptoms of lactose intolerance[232,233] and inflammatory bowel diseases[234] ; benefits for weight- and fat-loss and reduced markers of

diabetes and metabolic syndrome[235-239]; reducing oxidation,[240,241] inflammation and inflammation-related pain;[242,243] improved cardiovascular markers (cholesterol and lipid profiles);[244] depression,[245,247] anxiety, and autism spectrum disorder.[248]

Probiotics also improve constipation in children by increasing stool frequency.[249] Furthermore, in children, probiotics significantly reduce jaundice,[250,251] and reduce the incidence and severity of respiratory tract infections,[252,254] and allergic rhinitis.[255,257] Overall, the use of probiotics is associated with reduced mortality and morbidity in children in low-to-middle income countries,[258] and improved growth rates in under-nourished children.[259]

The extant evidence shows reduced eczema in infants,[260,261] and probiotics also appear to reduce atopic dermatitis and are protective in moderate-to-severe cases of this condition.[262]

**Why L. acidophilus and Bifidobacteria?**

Specifically, *L. acidophilus* and *Bifidobacterium* species are able to bind with food-borne toxins like aflatoxin (from mould grown on food), effectively eliminating them from the body,[263] and also compete with and aid resistance to pathogens like *Escherichia coli*, *Staphylococcus aureus*, *Pseudomonas aeruginosa*, *Listeria monocytogenes*, *Vibrio parahaemolyticus*, *Vibrio cholerae*, *Helicobacter pylori*, *Klebsiella*, *Salmonella*, *Shigella*, *Bacillus*, *Clostridium*, *Mucor*, *Aspergillus*, *Fusarium*, *Trichoderma* and *Candida spp.*[264] *Lactobacillus acidophilus* also significantly reduces LDL cholesterol ($P<0.001$) compared to other types of strains and probiotic supplements including this strain are effective in lowering lipid levels and other factors associated with cardiovascular disease.[265,266] Interestingly, the combination of probiotics with plant phenols (like those found in this formula) provides synergistic benefits, with greater survival, adhesion, and maintenance of beneficial bacteria and improved health benefits.[267]

# SUPERFOODS

## Spirulina

**Form:**
Powdered organic *Arthrospira platensis*
**Key body systems:**
Endocrine, circulatory, immune, excretory

Spirulina is the common name for a species of blue-green algae; a complex biomass of cyanobacteria that provides a nutrient-dense food source. Blue-green algae have been used for millennia as a food, especially by Mesoamerican cultures.

**Key benefits of spirulina supplementation:**

- Reduced seasonal allergies
- Liver protection and protection from toxins
- Antioxidant and anti-inflammatory
- Improved cardiovascular health
- Improved metabolic markers
- Improved immune function

Spirulina is thought to reduce the incidence and severity of seasonal allergies, along with protection from heavy metals and other toxins and general protection of the liver,[268] along with general benefits for reducing oxidation[269] and the signs of aging, enhanced immunity, improved cardiovascular and diabetic markers,[270] reduced inflammation, and resistance to cancer.[271,272] Reviews of the scientific literature show that spirulina might offer interesting benefits to those with cardiovascular risk factors. It has been demonstrated to reduce total cholesterol and LDL-cholesterol and triglycerides while increasing ('good') HDL-cholesterol.[273]

Spirulina (alone and as part of a multi-nutrient) has been shown to aid the growth, immunity and development of undernourished children,[274,276] and reduces upper respiratory infections.[277] The carotenoids in spirulina are well absorbed by children,[278] and reliably increase vitamin A levels.[279] Spirulina might also help to improve asthma control in children.[280]

**Why organic spirulina?**

Spirulina and similar algae are able to accumulate heavy metals and toxins, which, while one of the promising roles in the body can be problematic if they have been exposed to heavy metals and toxins when grown or processed. Hence, it is important that safe, organic forms of this nutritional supplement are used.

## Red marine algae

**Form:**
Whole, dried *Lithothamnion calcareum*
**Key body systems:**
Immune

*L. calcareum* is a species of nutrient-rich marine algae (seaweed). Red algae have a long history of use in human nutrition due to their high nutrient content, including many essential and trace minerals.

**Key benefits of red marine algae supplementation:**

- Improved multi-mineral nutrition
- Overall health benefits from improved micro-nutrition
- Support for bone health

The main role of red marine algae is for its nutritive role. It provides various minerals, including calcium (30% of weight), magnesium (6%) and trace minerals.[281] This nutrient density is thought to be responsible for the benefits seen in animal research, namely, reductions in bone-loss in mice when fed L. calcareum.[282] It has also been shown to be as effective for reducing cancer growth in calcium-sensitive cells as calcium itself.[283]

**Why *L. calcareum?***

Red marine algae in the form of *L. calcareum* is included as a nutrient-dense multi-mineral. This provides not only important minerals like calcium to the formula but a complex of synergistic minerals and trace nutrients beneficial for overall health and from a traditionally used source.

## Organic wheat grass

**Form:**
Powdered freshly sprouted leaver of *Triticum* plants
**Key body systems:**
Immune, digestive

Wheat grass is the freshly sprouted leaves of the wheat plant. Wheat grass provides a nutrient-rich food that is free-from gluten and rich in chlorophyll, flavonoids,

Similar health benefits are claimed for barley leaf as Wheat grass and the functional outcomes are likely to be similar. Most of the research at this stage specifically on barley leaf has focused on the antioxidant activity of the leaves and they have demonstrated a strong antioxidant action.[285-287]

**Why barley leaves?**

Barley leaf is a nutrient-dense food that supplies a range of essential and secondary nutrients to support the wholefood complex of nutrition in the formula.

### Kelp

**Form:**
Whole, dried *Fucus vesiculosus*
**Key body systems:**
Immune, endocrine

Kelps are large brown algal seaweeds that have been used by peoples throughout the world as nutrient-rich foods and as herbal medicine compounds since ancient times. Kelp is high in trace nutrients and minerals that are often deficient in modern soils (especially in some countries e.g. New Zealand) such as iodine and selenium.

**Key benefits of kelp supplementation:**

- Micronutrient support of the thyroid gland
- Improved overall nutrition status

Kelp is high in iodine, a mineral that is essential for the creation of thyroid hormones and traditional medicinal use has typically been for the nutritional support of the thyroid gland. Pre-clinical evidence has also suggested that there might be anticoagulant and anti-diabetic effects of kelp supplementation for which further research is required.[288]

**Why kelp?**

Kelp provides a natural source of trace nutrients, especially iodine, and is used in the formula to help provide this nutritional support (not therapeutic dosages, for which prescription by a registered practitioner is required).

### *Dunaliella salina*

**Form:**
*Dunaliella salina* dried extract
**Key body systems:**
Immune, endocrine

*Dunaliella salina* is a green micro-alga that is found living in salt-fields. It is especially prized for its antioxidant activity due to its ability to make large amounts of carotenoids and glycerol which function to protect it against light damage and osmotic pressure respectively.

**Key benefits of *Dunaliella salina* supplementation:**

- A natural and superior source of carotenoids
- Improved antioxidant status

Dunaliella is known for its accumulation of large quantities of carotenoids. The antioxidant effects of these carotenoids, specifically from Dunaliella have been demonstrated in rats, and interestingly, the naturally occurring carotenoids from *D. salina* were more effective for this purpose than dose-matched synthetic beta-carotene.[289]

**Why *Dunaliella salina*?**

Dunaliella is rich in the antioxidant carotenoids and the emerging research suggests that this natural source is superior for antioxidant effects that synthetic beta-carotene commonly used as the sole carotenoid in supplements.

## VEGETABLES, BERRIES, AND FRUITS

### Vegetable blend

**Beetroot, broccoli sprout, carrot, spinach**

**Form:**
Whole vegetable powders of *Beta vulgaris* taproot, *Brassica oleracea 'italica'* sprout, *Daucus carota 'sativus'* taproot, *Spinacia oleracea* leaves

**Key body systems:**
Immune, circulatory, respiratory, nervous

Nutrient-rich vegetables lack in the modern diet. Many people fail to get enough vegetables in their diets, and yet, there is a linear association between vegetable intake and health outcomes.

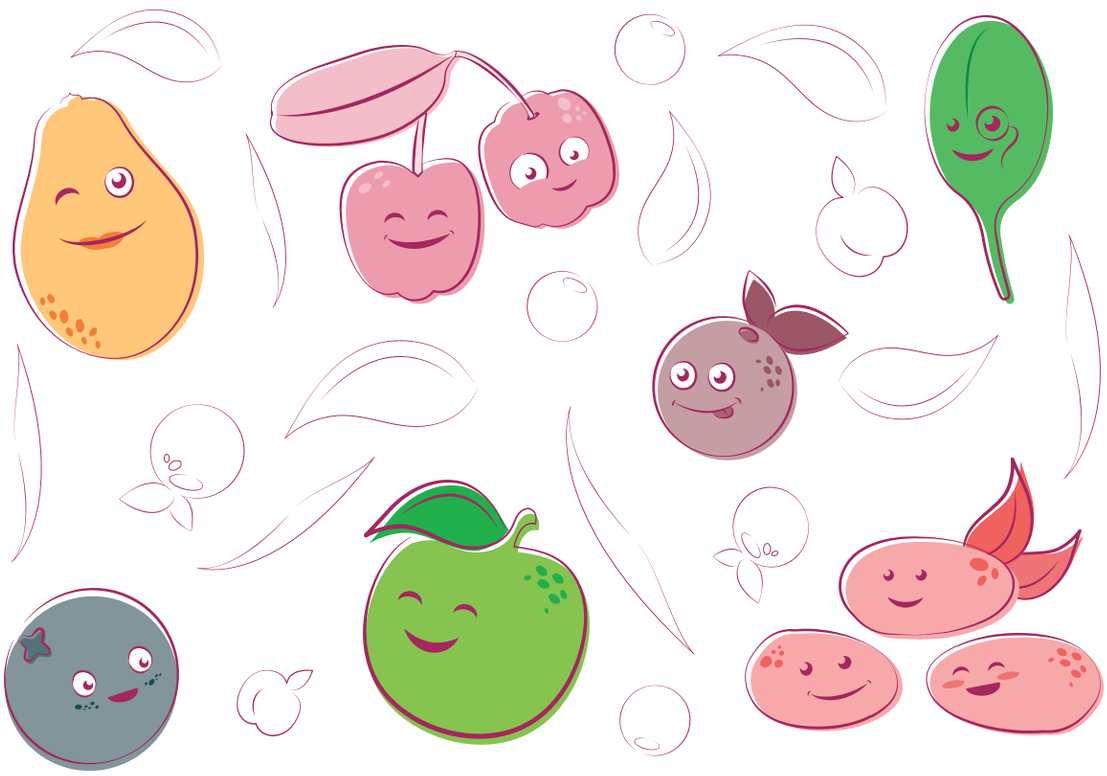
**Key benefits of supplementing with vegetable blends:**

- Improved overall nutrient status
- Antioxidant
- Improved endurance performance
- Anti-hypertensive
- Reduced inflammation
- Possible anti-cancer effects
- Improved cognition

Vegetables are rich sources of both primary, essential nutrients and secondary nutrients critical to health. Beets are high in folate and manganese and also provide rich 'red' anthocyanins which have antioxidant effects. Beetroot also contains high levels of nitrates that have been demonstrated to reduce high blood pressure[290] and improve endurance performance.[291]

Broccoli is rich in vitamins C and K, B vitamins, the carotenoids lutein and zeaxanthin, and the sprouts of the broccoli plant are high in the prospective anti-cancer compound sulforaphane. Early research suggests that sulforaphane-rich broccoli sprout extracts positively modify innate oxidative responses,[292] reduce inflammatory markers in those with diabetes,[293] and might be useful for cancer treatment.[294] They might also improve cognitive decline in people with schizophrenia.[295]

Carrots are especially high in vitamin-A precursor carotenoids beta-carotene and alpha-carotene, along with gamma-carotene, lutein, zeaxanthin, and vitamin K and B-vitamins. Insufficient intake of vitamin-A and its precursors can lead to problems



carotenoids beta-carotene and alpha-carotene, along with gamma-carotene, lutein, zeaxanthin, and vitamin K and B-vitamins. Insufficient intake of vitamin-A and its precursors can lead to problems with night-vision, along with immunity and gene expression.

Spinach is a rich source of vitamins A, C, E, and K, magnesium, manganese, iron, calcium, potassium, folate and the B-vitamins riboflavin and vitamin B6. Animal and other research have suggested that spinach, due to the combination of essential nutrients and secondary antioxidants it contains, could help to protect against oxidation, neurodegenerative disorders, and improve cognition.[296]

**Why added vegetables and extracts?**

Many children do not routinely eat all the vegetables that they require for optimal health. Vegetable extracts and powders can help to address this and provide a range of synergistic primary and secondary nutrients for the whole-food base of this formula.

## Fruit and berry blend

**Acerola, apple, bilberry, blackcurrant, goji berry, papaya**

**Form:**
Fruit powders of *Malus pumila* and *Carica papaya*. High-potency extracts from the fruit of *Malpighia emarginata*, *Vaccinium myrtillus*, *Ribes nigrum*, and *Lycium barbarum.*
**Key body systems:**
Immune, circulatory, respiratory, nervous

Fruits and berries contain many essential and 'conditionally essential' nutrients for health. Fruit powders provide additional nutrients, while berries provide a range of antioxidants beneficial to both health and performance and are considered both foods and traditional medicines.

**Key benefits of supplementing with fruit and berry blends:**

- Improved overall nutrient status
- Antioxidant
- Improved endurance performance
- Reduced inflammation
- Possible anti-cancer effects
- Improved cognition
- Improved eye health

Acerola is one of the richest sources of vitamin C (50-100 times that of oranges) and has extremely high antioxidant properties which have led to it being researched for anti-ageing properties and benefits to overall health.[297]

Apples contain a balance of essential micronutrients to increase the nutrient-density of the diet.

Bilberry is rich in anthocyanins and, while further research is required, might help play a protective role for a range of conditions including cataracts, heart disease, diabetes, dysmenorrhoea, and retinopathies.[298]

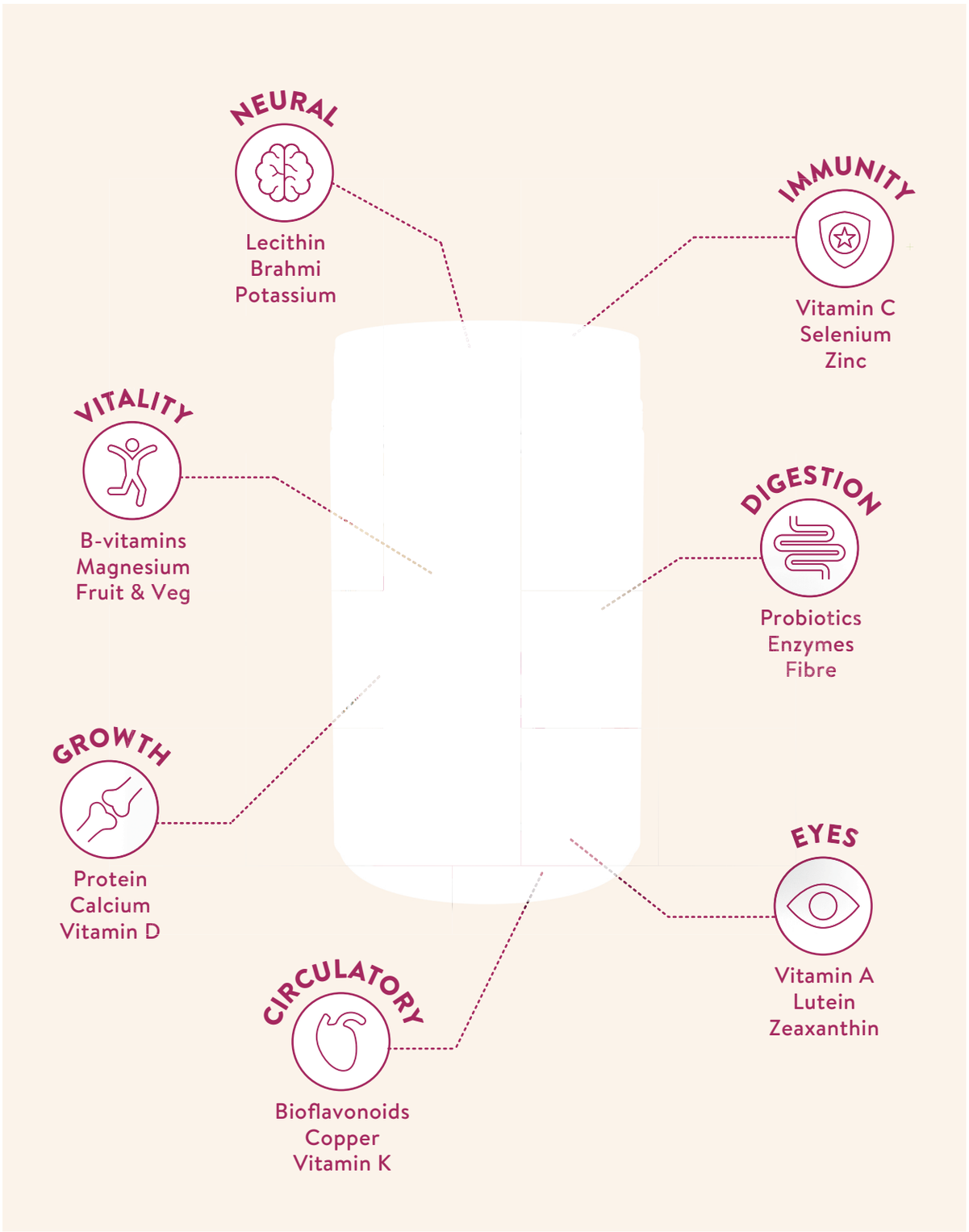
Blackcurrants are rich in vitamin C, iron, and manganese, along with very high levels of anthocyanin polyphenols that are being researched for their antioxidant effects and other health benefits. Early human studies have shown reduced visual deterioration in glaucoma,[299] and benefits to overall performance in repeated exercise activities,[300] from blackcurrant extracts.

Goji or wolfberry is another berry rich in antioxidants which has been used extensively in cuisine and medicine in Asia since ancient times. Current research suggests that goji might offer benefit to health overall and to conditions such asthma, prevention of cancer, cognition, immunity, vision, and anti-ageing. [301]

Papaya is a traditional food and medicine, high in carotenoids, vitamin C and folate, along with antioxidant phytochemicals and papain and chymopapain, protein-digesting enzymes that have anti-microbial properties.[302] *In vitro* research has suggested a potential anti-cancer role for papaya and this being investigated.[303]

**Why added fruits and berries extracts**

Fruits and berries provide a vast array of antioxidant phenols and other phytochemicals that exhibit an array of benefits to health. Whole food derived extracts of fruits and berries help to support overall nutrition for kids more than just providing the primary, essential vitamins and minerals.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IMMUNITY
Vitamin C
Selenium
Zinc
VITALITY
B-vitamins
Magnesium
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DIGESTION
Probiotics
Enzymes
Fibre
GROWTH
Protein
Calcium
Vitamin D
EYES
Vitamin A
Lutein
Zeaxanthin
CIRCULATORY
Bioflavonoids
Copper
Vitamin K

# COMMON QUESTIONS

## 1

**Gut health – why apple pectin and not inulin or FOS as a prebiotic?**

Apple pectin is typically more easily tolerated by those who are sensitive to fibres and resistant starches than fructo-oligosaccharides or inulin.

## 2

**Why use vitamin D3 from lichen? – why not use D2 as a vegan solution?**

D3 is considered to be a superior source for health and is naturally occurring and produced form in the human body. However, most vitamin D3 is produced from sheep's lanolin and so, cannot be used by those following a vegan lifestyle. We use vegan vitamin D3 extracted from lichen plants so that all of our users can benefit from the superior form of this essential vitamin.

## 3

**Why vitamin K2 (as menaquinone 7)? – why not just rely on the K1 already present in the plant ingredients?**

Both K1 and K2 are highly valuable for the body. However, specific benefits for circulatory health have been noted for vitamin K2, especially from the MK-7 form. It is also not very plentiful in most diets and so, both K1 and K2-MK-7 are used in the formula to give a spectrum of benefits not always provided by the modern diet.

## 4

**What is the advantage using red marine algae as the calcium source?**

Red marine algae in the form of *L. calcareum* provides an absorbable form of calcium from an entirely natural, traditionally used-source. It also provides a complex of synergistic minerals and trace nutrients beneficial for overall health.

## 5

**What is the advantage of using kelp as the iodine source?**

Kelp is nature's very best source of the essential mineral iodine. It also contains an array of other beneficial essential and secondary nutrients.

## 6

**Why include mixed natural tocopherols and mixed natural carotenoids?**

While alpha-tocopherol has been considered the 'active' vitamin E and is very important for health, all of the vitamin E family have benefits to human function. For example, alpha and gamma tocopherols provide contrasting and complementary actions for immune and inflammatory modulation. Gamma forms have also been shown to be more effective antioxidants and excessive amounts of alpha-tocopherol alone might inhibit these effects. For the balance of our innate immune, inflammatory and antioxidant pathways, we have included a mixed, natural vitamin E blend.

## 7

**Why have we avoided rice bran, soy lecithin and alfalfa?**

While these foods can be healthy additions to the diet, they can also contain anti-nutrients and allergens (in the case of soy and rice bran) which can affect the digestion and absorption of nutrients for some people. Alfalfa is also a nutrient-dense food but high intakes and isolated extracts might be of concern for triggering relapses of autoimmune conditions.

## 8

**Why is there no added Iron?**

Iron is an essential nutrient and many people are deficient in it. However, a large minority of people might also experience a sub-clinical iron overload

# COMMON QUESTIONS

## 8

that can put them at risk of increased risk of poor health (especially poorer cardiovascular health) over time. There is a small, supportive amount of iron derived from the range of whole-food ingredients but additional iron has not been added due to the risk of iron overload for some. It is recommended that anyone who suspects they may require additional iron seeks advice from a qualified health practitioner.

## 9

**Why is there only 8g of protein?**
8g of protein is an effective, kid-friendly dose of high-quality protein.

## 10

**How and when is Kids Good Stuff best taken?**
Kids Good Stuff is best taken every day, either in the morning or straight after school. Many kids start their day with Kids Good Stuff (alongside a healthy breakfast) or use it as a snack immediately after school or after sports. It can also be used alongside meals or morning/afternoon snacks to help bolster the nutrient content of the diet.

## 11

**Do my kids need to take a multivitamin?**
While we always promote food first, we also acknowledge there is a benefit to supplementing as a way boost nutritional intake and provide your kids with a bit of nutritional insurance. Kids Good Stuff is a multinutrient formula designed specifically with kids' needs in mind. Providing the benefits of a multivitamin plus a whole lot more goodness, because it also contains a range of nutrient-dense whole food ingredients, including berries, vegetables, fruits, herbs, and more!

## 12

**I'm an adult, can I take Kids Good Stuff?**
You sure can! Many people take Kids Good Stuff as an extra 'boost' for vitamins and minerals, that tastes great! That's why we say it's great for all ages from four years and up!

References available upon request.

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