

The Ultimate Guide to Vitamin B

Author - Jackie Newson
BSc Hons, Nutritional Therapist

Editor - Susie Debice
BSc Hons, Dip ION, Food Scientist and
Nutritional Therapist

With comments from cardiologist
Dr Thomas E Levy MD, JD

 **ABUNDANCE & HEALTH**
HIGH PERFORMANCE NUTRIENTS



If you're ready to join the smart group of people who are seriously interested in maintaining good health and wellbeing, then it's time to hear all about the benefits of B vitamins in terms of supporting normal hormone balance, skin function, energy, mind and mood. This group of vitamins don't just put pep in your step, they also have an enormous range of other fabulous health benefits, which become increasingly important the older you become.

Contents

INTRODUCTION	2
WHAT ARE B VITAMINS?	3
THE MANY ROLES OF THE B VITAMINS	8
HOW MUCH OF THE B VITAMINS DO YOU NEED?	12
WHAT ARE THE BEST FOOD SOURCES OF THE B VITAMINS?	13
ARE THERE RISK FACTORS FOR B VITAMIN DEFICIENCIES?	14
SIX QUICK FACTS ABOUT B VITAMINS	
ARE THERE DIFFERENT TYPES OF VITAMIN B SUPPLEMENTS?	15
WHAT EXACTLY ARE LIPOSOMES?	
WHY ARE PHOSPHOLIPIDS SO IMPORTANT?	16
WHY CHOOSE A LIPOSOMAL B COMPLEX?	
TOP 5 ADVANTAGES OF ALTRIENT B VITAMINS	17
HOW SAFE ARE B VITAMINS?	
REFERENCES	18



Introduction

The B vitamins, like all other vitamins, are natural compounds which the body requires to help us stay healthy. Bacteria found in the gut microbiome make B vitamins which may be readily absorbed. But generally, the microbiome doesn't produce enough B vitamins to meet our daily needs, so you need to get them directly from food. A healthy, balanced diet that includes wholegrains, legumes, seeds, nuts and dark leafy vegetables is the ideal way to maintain adequate dietary levels of B vitamins. But if these aren't your favourite foods then you can always top-up with a B complex nutritional supplement.



What are B vitamins?

The B vitamins were once thought to be a single vitamin referred to as vitamin B. However, scientific research has since identified vitamin B as a group of eight different water-soluble compounds, collectively called B vitamin complex. Being water soluble, B vitamins are rapidly eliminated through the urine and not easily stored in the body, which means you need to regularly top up your intake to avoid shortages.

Although each individual B vitamin has essential functions in the body, it is generally recognised that they often work better synergistically, which is why in nutritional supplements they are usually found together, as a complex. As a combined force, they help to support normal growth and metabolism. A vitamin B complex supplement usually delivers all eight B vitamins.

Although the B vitamins work efficiently as a team, decades of research have identified that each B vitamin has a unique and important function in the body. Let's take a closer look at how each B vitamin influences health and wellbeing.

1. Vitamin B1 - thiamine

Thiamine acts as a cofactor for the enzyme thiamine pyrophosphate which is also known as the active form of vitamin B1. Thiamine has many important health benefits including:

- **converting carbohydrates into energy**
- **supporting the nervous system**
- **supporting heart function**
- **contributing to normal psychological function¹**

Severe thiamine deficiency is relatively rare (except in alcoholics) and leads to a condition known as beriberi. If you're low on thiamine then you might initially experience fatigue, sleep disturbances, low mood and constipation.

2. Vitamin B2 – riboflavin

Riboflavin is needed by the body to help produce two major coenzymes, flavin mononucleotide and flavin adenine dinucleotide. These important enzymes help to release energy from fat, protein and carbohydrates.²

Riboflavin is also needed for tryptophan metabolism and overall helps the nervous system to function normally. Additional areas of health that riboflavin contributes to include:

- **protecting cells from oxidative stress**
- **supporting iron metabolism and red blood cell production**
- **supporting normal skin function**
- **supporting the normal mucous membranes**
- **maintaining normal vision^{2,3}**

Lack of riboflavin may result in decreased energy production particularly in cells that replicate frequently such as those found within the mucous membranes and skin. If you're deficient you might notice your lips and corners of the mouth cracking or your tongue and eyes are sore and inflamed.⁴

3. Vitamin B3 – niacin

Many of the B vitamins help support the action of important cellular enzymes that play a key part in the way that our cells produce energy. Vitamin B3, also known as niacin, helps support the action of two coenzymes - nicotinamide adenine dinucleotide (NAD) and nicotinamide adenine dinucleotide phosphate (NADP). These coenzymes are involved in more than fifty different metabolic reactions in the body, ranging from energy production to maintaining the skin and mucous membranes and helping keep the nervous system healthy.^{2,3} Studies show that niacin also contributes to normal psychological function and that a severe deficiency may lead to confusion and even contribute to dementia, which are common characteristics of a condition known as pellagra.⁴

4. Vitamin B5 – pantothenic acid

Vitamin B5, also known as pantothenic acid, functions as part of natural compound called coenzyme A (CoA) which is used by all cells in the body during the process of energy production.

This vitamin also contributes to normal:

- **adrenal activity**
- **production of several steroid hormones, cholesterol and vitamin D**
- **production of vitamin D**
- **synthesis of the neurotransmitter acetylcholine^{2,3}**

Studies show that B5 helps to reduce tiredness and signs of deficiency may include weakness, fatigue, sleep disturbances and nausea. However, a vitamin B5 deficiency is relatively rare since this vitamin is found in such a wide range of foods.⁴

5. Vitamin B6 – pyridoxine

Just like many of the B vitamins the roles of vitamin B6 include contributing to energy production, metabolism, helping reduce tiredness and fatigue and contributing to normal psychological function. But vitamin B6, also known as pyridoxine or P-5-P, is also involved with:

- **the formation of cysteine, body proteins and structural compounds**
- **supporting the synthesis of chemicals involved with transmitting nerve signals within the nervous system**
- **supporting normal red blood cell formation**
- **helping regulate hormones**
- **supporting normal immune function⁴**

Studies show that a deficiency of vitamin B6 is relatively rare, but characterised by mental confusion, depression and impaired nerve function.

6. Vitamin B7 – biotin

As a member of the B vitamin family, biotin also contributes to the metabolic processes in which protein and carbohydrates are broken down and converted into energy. But this B vitamin is a true beauty star since it contributes to normal hair condition and skin function. Biotin also contributes to the normal functioning of the nervous system and plays an important role in normal psychological function.

Dry, scaly skin, poor hair condition and hair loss, as well as conjunctivitis and neurological issues are just some of the symptoms that may be associated with a lack of biotin.⁴

7. Vitamin B9 – folate

Folate, also known as folic acid, tends to team up and work together with vitamin B12 in many body processes. Just like vitamin B6, folate helps reduce tiredness and fatigue, helps the production of new red blood cells and supports normal immune function. But this particular B vitamin has an important role to play during pregnancy when it's vitally important for DNA synthesis, cell growth and foetal development and supports the normal development of the baby's nervous system.

Without folate, cells do not divide and replicate properly which affects all cells and tissues in the body, but it is the high turnover cells such as red blood cells and cells that line the intestine and genital tracts that could be most affected.⁴

Women planning pregnancy require a diet rich in folate and are recommended to take a folic acid supplement to help reduce the risk of neural foetal abnormalities. Symptoms of folate deficiency include tiredness, fatigue and weight loss.

8. Vitamin B12 – cobalamin

Vitamin B12 is generally known as cobalamin, however there are many variations of vitamin B12 including methylcobalamin, adenosylcobalamin, cyanocobalamin, hydroxocobalamin.⁵

In its natural state vitamin B12 is found bound to protein in food, the action of stomach acid during digestion releases B12 which then combines with a substance in the stomach called intrinsic factor, before being absorbed into the bloodstream.

Vitamin B12 like many of the other B vitamins plays a part in supporting the production of new red blood cells. As well as this, vitamin B12 is a coenzyme for a variety of metabolic functions including carbohydrate and fat metabolism and protein synthesis. Vitamin B12 is responsible for reactivating folate and they work together to help synthesise DNA.⁴

A deficiency of vitamin B12 is commonly seen in the elderly and some vegans and may result in a form of anaemia. Signs and symptoms of low levels of vitamin B12 may include numbness, pins and needles, fatigue, diarrhoea, depression, mental confusion and a smooth tongue.⁶



The many roles of the B vitamins

In a general sense the B vitamins tend to interact with enzymes and enable the enzymes to function more effectively. They facilitate and influence vital cellular chemical reactions such as energy production and help regulate the metabolic and physiological processes considered indispensable for the proper functioning of the body.⁷



1. How do the B vitamins support fitness levels?

When it comes to sports, physical performance and leading a more active lifestyle, B vitamins are incredibly important whether you're a top athlete or simply enjoy regular workouts at the gym. This is because vitamins B1, B2, B3, B5, B6 and B12 all contribute to normal energy yielding metabolism. What's more vitamins B2, B3, B5, B6 and B12 also contribute to the reduction of tiredness and fatigue which could come in handy for supporting motivation, helping build stamina or for helping your post workout recovery.

2. Could B vitamins help premenstrual hormone balance?

Some women experience a range of symptoms during the premenstrual phase of their cycle such as low mood, breast tenderness and bloating, which may be associated with changing hormone levels. There are two B vitamins that may be helpful for supporting monthly hormone balance. Studies have shown that vitamin B5 is required for the normal synthesis of reproductive steroid hormones (oestrogen, progesterone, testosterone) and vitamin B6 is involved in the regulation of hormonal activity, which makes them an ideal combination for those hormonally challenging months.

3. How do B vitamins support mood, concentration and memory?

Maintaining optimal brain health throughout all life stages is probably top of most people's list. There are several dietary and lifestyle factors which could impact cognitive function and state of mind including your intake of certain nutrients like vitamins B3, B6, B12 and folate. These are particularly important because they contribute to normal psychological function, whilst vitamin B5 contributes to normal mental performance.

4. What's the link between B vitamins and heart health?

High levels of a substance called homocysteine are thought to increase the risk of heart attacks and strokes by contributing to a hardening of the arteries.

Like cholesterol, prolonged elevated levels of homocysteine may irritate the inner lining of blood vessels, which may result in plaques forming that narrow and harden the arteries.⁸ Researchers have discovered that folic acid, vitamin B6 and B12 all contribute to normal homocysteine metabolism, so they play a very important role in supporting a healthy heart. Vitamin B1 has also been shown to contribute to the normal function of the heart.

5. Could the eyes benefit from B vitamins?

Many of us take our 20:20 vision for granted but as soon as you hit a certain age you might start to think of ways to help preserve your eyesight. Studies show that vitamin B2 contributes to the maintenance of normal vision so this vitamin has a hand in helping keep your eyes healthy.

6. Do B vitamins contribute to stress resilience?

If you're permanently stressed, the B complex vitamins could be just the nutritional support you need. Vitamins B6, B12, thiamine and niacin all contribute to normal functioning of the nervous system.



How much of the B vitamins do you need?

The Nutrient Reference Value (NRV) for B vitamins vary according to each individual B vitamin and are considered to the dietary level required to help maintain normal health for healthy individuals. B vitamins are found in many natural foods including complex carbohydrates such as wholegrain, pulses and lentils.

Daily NRV for B vitamins:

- **B1** - men = 1mg, women = 0.8mg
- **B2** - men = 1.3mg, women = 1.1mg
- **B3** - men = 17 mg, women = 13 mg
- **B5** - no UK NRV for vitamin B5 but the European RDA is 6mg
- **B6** - men = 1.4 mg, women = 1.2 mg
- **Biotin** - no UK NVR for biotin but the European RDA is 150mcg
- **Folate** - adults = 200mcg plus an extra 100mcg during pregnancy and 60mcg during lactation. Recommended preconception levels are 400mcg until the 12th week of pregnancy
- **B12** - men = 1.5 mcg, women = 1.5 mcg

What are the best food sources of B vitamins?

VITAMIN	FOOD SOURCE
B1 THIAMINE	Brewer's yeast, wheat germ, oatmeal, brown rice, lentils, peas, seeds, nuts and beans
B2 RIBOFLAVIN	Brewer's yeast, calf's liver, lentils, nuts, seeds, beans, mushrooms and green leafy veg
B3 NIACIN	Brewer's yeast, ox liver, swordfish, brown rice, buckwheat, seeds, nuts, eggs
B5 PANTOTHENIC ACID	Brewer's yeast, calf's liver, soybeans flour, lentils, chickpeas, brown rice, avocados, nuts, seeds, green leafy veg, mushrooms
B6 PYRIDOXINE	Brewer's yeast, lentils, brown rice, chickpeas, barley, avocados, bananas, seeds, nuts, beans, green leafy veg, sweet potatoes, cauliflower
B7 BIOTIN	Brewer's yeast, ox liver, soybeans, barley, oatmeal, cauliflower, mushrooms, nuts
B9 FOLATE	Brewer's yeast, ox liver, wheat bran, chickpeas, lentils, peanut butter, barley, dried figs, avocado, blackberries, beans, nuts, green leafy veg, mushrooms, corn
B12 COBALAMIN	Liver, eggs, meat, seafood, fish, cheese

* Source: Murray & Pizzorno (2006): The Encyclopaedia of Healing Foods, Bath Press, Bath

Are there risk factors for B vitamin deficiencies?

Because the B vitamins are water-soluble, they are not easily stored in the body for significant periods of time (with the exception of vitamin B12 and folate, which are stored in the liver).⁹ Therefore a daily supply of B vitamins must be consumed as part of a healthy, balanced and nutritious diet. The elderly, vegans, alcoholics and those with Crohn's disease and coeliac disease are most at risk of B vitamin deficiencies.

Six quick facts about the B vitamins

1. An excess of riboflavin may give the urine a bright yellow-green glow!
2. B vitamins sourced from food are easily lost during cooking as well as being destroyed by exposure to air and light.⁴
3. Thiamine is extremely sensitive to alcohol and sulphites, both of which may interfere with the absorption and utilisation of thiamine in the body.
4. Despite being found in a large variety of foods, folic acid deficiency is widespread around the world.¹⁰
5. It's estimated that 50 - 70% of vegetarians and vegans have inadequate vitamin B12 levels.¹¹
6. Although tempeh, miso and seaweed are reported to contain vitamin B12, it's unlikely that the B12 found in these foods is well absorbed. Prudent vegans should include a vitamin B12 supplement to top up their diet.

Are there different types of B vitamin supplements?

It is possible to purchase individual B vitamins but the body uses many of the B vitamins in combination to perform certain functions and because they are so interrelated, supplementing with a high dose of one may be of little value and could potentially increase the risk for a deficiency of the others. The ideal option is to take a B complex supplement, that contains a little of all eight B vitamins and then top up with individual B vitamins as recommended by a health professional.

Vitamin B supplements like other vitamins are available in many different forms including liposomes, tablets, capsules, powders, liquids, sprays and gels. Many supplements (except liposomes) contain various synthetic excipients, which are ingredients that serve no active nutritional purpose. They are added to enhance flavour, stability, manufacturing processes and shelf life, but may also affect the bioavailability of the vitamin.

Liposomes by contrast use phospholipid excipients, which are natural compounds that offer additional health benefits as well as ensuring maximised absorption.

What exactly are liposomes?

Liposomes are spherical nanoparticles that encapsulate nutrients transporting them rapidly into the bloodstream, whilst protecting the nutrients inside from oxidation and degradation. The outer shells of the liposomes are very similar in structure to human cell membranes, so they easily fuse together creating an opening for the nutrient to be delivered effectively into the cell. The unique delivery system of liposomal technology ensures far superior absorption of nutrients compared to standard oral B complex supplements.

Liposomal Altrient B is manufactured by LivOn labs in the US using unique patented Liposomal Encapsulation Technology (LET).

Why are phospholipids so important?

Phospholipids are a class of lipids (fats) that are major components of cell membranes, providing structure, flexibility and protection to all cells.

Maintaining fluidity of the cell membranes ensures efficient transport of nutrients, hormones and neurotransmitters. Phospholipids are also an important source of the major omega 3 fatty acids found in membranes and known to contribute to the normal function of the heart.

Why choose a liposomal B complex?

The body's capacity to store B vitamins is limited, so if your diet is lacking in foods that naturally contain good levels of B vitamins then you may be vulnerable to a deficiency. A high quality well absorbed B complex supplement such as liposomal Altrient B may help to bridge the gap when you are unable to regularly eat a well-balanced, nutritious diet. An increasing body of evidence supports the advantages of liposomal supplements for efficient delivery of nutrients and maximised absorption.

Top 5 advantages of Altrient B vitamins

1. **Superior absorption** – uses cutting edge clinically researched liposomal encapsulation to enable far greater absorption and uptake compared with other oral forms of B vitamins
2. **Supports daily requirements** – contains a full spectrum of B vitamins to keep levels topped up
3. **Supports immune function** – unique formula is enhanced with zinc and selenium
4. **Helps to maintain normal blood glucose levels** – with the addition of chromium and cinnamon
5. **Convenient** – single dose gel sachets are easy to take on the go for a busy demanding lifestyle

How safe are B vitamins?

Although B vitamins are generally considered safe, you need to be cautious with the following:¹²

- **Vitamin B3** – also known as nicotinic acid may cause skin flushes and liver damage if high doses are consumed over a long period of time
- **Vitamin B6** – more than 200mg/day in the long term may lead to numbness in the arms and legs
- **Folate** – doses higher than 1mg/day could mask the symptoms of vitamin B12 deficiency

References

1. Jamison J (2003). Clinical Guide to Nutrition & Dietary Supplements in disease management. Churchill Livingstone: Australia.
2. British Nutrition Foundation. Nutrients. <https://www.nutrition.org.uk/healthyliving/basics/exploring-nutrients.html?start=2>
3. Kreutle S & Toohey L (1999). Nutritional Physiology: Clinical Applications and Scientific Research. HealthQuest Publishing.
4. Pizzorno. The Encyclopedia of Healing Foods.
5. Brady DM, Paul C. Comparative Bioavailability and Utilization of Particular Forms of B₁₂ Supplements With Potential to Mitigate B₁₂-related Genetic Polymorphisms. *Integr Med (Encinitas)*. 2017;16(1):42–49.
6. Better Health. Vitamin B. <https://www.betterhealth.vic.gov.au/health/healthyliving/vitamin-b>. [Accessed 17.1.20]
7. Kennedy DO. B Vitamins and the Brain: Mechanisms, Dose and Efficacy--A Review. *Nutrients*. 2016;8(2):68.
8. Misita CP et al. Homocysteine and MTHFR Mutations Relation to Thrombosis and Coronary Artery Disease. *Circulation* 2005;111: e289-e293.
9. Amboss. Vitamins. <https://www.amboss.com/us/knowledge/Vitamins>. [Accessed 17.1.20.]
10. Bailey R, L, West Jr. K, P, Black R, E: The Epidemiology of Global Micronutrient Deficiencies. *Ann Nutr Metab* 2015;66(suppl 2):22-33.
11. Woo KS, Kwok TC, Celermajer DS. Vegan diet, subnormal vitamin B-12 status and cardiovascular health. *Nutrients*. 2014;6(8):3259–3273. Published 2014 Aug 19. doi:10.3390/nu6083259.
12. NHS. B Vitamins and folic acid. <https://www.nhs.uk/conditions/vitamins-and-minerals/vitamin-b/> [Accessed 17.1.20](M)





The Ultimate Guide to Vitamin B

IE: +353 (0)1 254 8889
UK: +44 (0) 20 3239 4907
info@abundanceandhealth.com

www.abundanceandhealth.co.uk