

Vitamin B12

Key points

- Vitamin B₁₂ is an essential nutrient needed for the making of red blood cells, the production of DNA and the healthy functioning of the nervous system
- Vitamin B₁₂ is found almost exclusively in animal-based foods including meats, poultry, seafood, milk, cheese and eggs
- Vitamin B₁₂ deficiency is a potential concern for someone following a vegan or vegetarian diet
- If you follow a vegan or vegetarian diet, eating foods fortified with vitamin B₁₂ or taking a supplement can be good ways to help reduce the risk of diet-related deficiency

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Vitamin B₁₂ (also called cobalamin) is an important vitamin. We need this vitamin to make red blood cells and new DNA for growing and dividing cells. Vitamin B₁₂ also helps maintain the health of the conductive coating that surrounds and protects nerves.

Vitamin B12 deficiency

Vitamin B₁₂ deficiency can be slow to develop. This means symptoms can appear gradually and intensify over time. Initial signs that someone could be deficient in vitamin B₁₂ include the following:

- pale skin
- confusion and memory problems
- fatigue
- headaches
- mood changes
- difficulty concentrating

Many of the symptoms of vitamin B₁₂ deficiency can be explained by its important role in making red blood cells. Deficiency of vitamin B₁₂ impairs the production of healthy red blood cells, giving rise to anaemia. The anaemia occurs due to a slowing of DNA synthesis resulting in the inability of red blood cells to divide. This type of anaemia is also called megaloblastic anaemia because the red blood cells appear large and immature under a microscope.

Vitamin B₁₂ deficiency has two main causes. Either from impaired absorption through the small intestine or from eating a diet that is low in this nutrient.

Inadequate absorption of vitamin B₁₂ can occur due to a lack of hydrochloric acid in the stomach or a lack of a special protein needed to bind to vitamin B₁₂. This protein is called intrinsic factor. With less stomach acid, the vitamin is not released from food and is not available for binding to intrinsic factor. Without intrinsic factor, the vitamin cannot be absorbed.

Many people over the age of 50 develop a chronic inflammatory condition of the stomach called atrophic gastritis. This affects the cells lining the stomach. Without healthy stomach cells, the production of hydrochloric acid and intrinsic factor diminishes. This can put a person with atrophic gastritis at risk of vitamin B₁₂ deficiency.

Surgery of the gastrointestinal tract, such as weight loss surgery or surgery to remove all or part of the stomach, can result in a loss of cells that produce hydrochloric acid and intrinsic factor. This reduces the amount of vitamin B₁₂ absorbed.

The second main cause of vitamin B₁₂ deficiency is from not having enough in the diet. A diet lacking in vitamin B₁₂ is common in people who follow a vegan or vegetarian diet unless it includes fortified foods like some plant-based milk. That's because natural food sources of vitamin B₁₂ are mostly limited to animal foods.

Depending on the cause, vitamin B₁₂ deficiency may be treated with dietary changes, vitamin B₁₂ injections or oral supplements.

Food sources of vitamin B12



Vitamin B₁₂ is unique among the vitamins because it is found almost exclusively in foods derived from animals. That includes fish, meat, poultry, eggs, milk, and milk products. Bioavailable vitamin B₁₂ is rarely present in plant foods.

Anyone who eats reasonable amounts of animal-based food can be confident of an adequate intake of vitamin B₁₂. People who are vegetarians and consume milk products or eggs also have a good level of protection from deficiency.

People who follow a vegan diet need a reliable source of vitamin B₁₂. With few exceptions, vitamin B₁₂ found naturally in plant foods is likely to be in an inactive form.

For someone following a vegan diet, consuming fortified foods or taking a vitamin B₁₂ supplement are the only viable ways to obtain enough of this nutrient. Food Standards Australia New Zealand permits only a limited number of foods to be fortified with vitamin B₁₂. This includes selected soy milks, yeast spread, and vegetarian meat analogues such as soy-based burgers and sausages.

Spirulina, which is a type of blue-green algae, is sometimes promoted as a good source of vitamin B₁₂. But it is present in an inactive form that the body cannot make use of and could even interfere with the absorption of other sources of vitamin B₁₂.

Popular fermented foods such as tempeh, kimchi, sauerkraut and kombucha only contain trace amounts of vitamin B₁₂.

Mushrooms do contain a small amount of active vitamin B₁₂. But the amount of mushrooms needed to supply adequate amounts of B₁₂ is impractical to make these a useful food source.

If you are pregnant or breastfeeding and follow a vegan or vegetarian diet, you should make sure you get enough vitamin B₁₂ to provide for your developing baby. If a breastfeeding mother is deficient in vitamin B₁₂, her infant may also become deficient.

When to see a dietitian



Plant-based diets which can be low in vitamin B₁₂ need to be well planned to meet your nutritional needs. An Accredited Practising Dietitian (APD) can help you meet your individual needs.

We recommend seeing a dietitian if you:

- have been diagnosed with vitamin B₁₂ deficiency and want some support on the dietary management of this condition
- need nutritional advice to help ensure you're meeting your individual nutrient requirements
- if you have specific nutritional needs, such as during pregnancy or for children
- would like advice on whether you need to add a vitamin B₁₂ supplement to your diet

Accredited Practising Dietitians (APDs) are university-trained nutrition experts. They can help you with personalised, easy-to-follow and evidence-based advice.

APDs are Australia's most trusted dietetics professionals.

[Find a dietitian](#)

Top tips

- If using a plant-based milk like soy or almond milk, choose one that is fortified with vitamin B₁₂
- If you follow a vegan diet, it may be good to speak to your doctor about getting your vitamin B₁₂ blood levels checked regularly

This health advice page was peer-reviewed by an Accredited Practising Dietitian (APD) in November 2022.