

# Vitamin B12 and ME/CFS

*Deficiencies and treatments. Sources and benefits.*



## Including:

- What is Vitamin B12?
- Best dietary sources of Vitamin B12
- Symptoms of Vitamin B12 deficiency
- What causes Vitamin B12 deficiency
- Is there any evidence of Vitamin B12 deficiency in ME/CFS?
- How Vitamin B12 deficiency is treated



**Vitamin B12 and ME/CFS** was written by **Dr Charles Shepherd**, Trustee and Hon. Medical Adviser to The ME Association.

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#### DISCLAIMER

We recommend that the medical information in this leaflet is discussed with your doctor. It is not intended to be a substitute for personalised medical advice or treatment. You should consult your doctor whenever a new symptom arises, or an existing symptom worsens. It is important to obtain medical advice that considers other causes and possible treatments. Do not assume that new or worsened symptoms are solely because of ME/CFS or Long Covid.



## INTRODUCTION

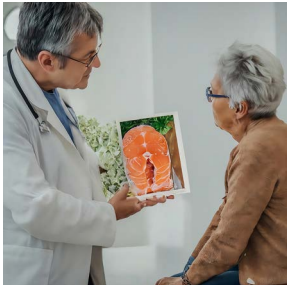
The ME Association receives regular queries and feedback relating to the use of vitamin B12 supplements in ME/CFS.

Vitamin B12 used to be prescribed by doctors as a 'tonic' for people with a wide variety of complaints, especially those involving fatigue. However, it is no longer used in this way due to the lack of any sound evidence that 'tonics' actually work.

So what is vitamin B12? Is there any evidence of vitamin B12 deficiency in ME/CFS? And could vitamin B12 be a safe and effective form of treatment for ME/CFS?

### Key points

- Vitamin B12 deficiency is linked to a potentially serious type of anaemia called pernicious anemia - where there are abnormally large red blood cells.
- Vitamin B12 deficiency causes fatigue and other ME/CFS-like symptoms - so it should be excluded before a diagnosis of ME/CFS is made, especially in people where there is no clear infective onset.
- There is no evidence that vitamin B12 deficiency occurs as part of the underlying disease process in ME/CFS.
- People with ME/CFS may be at risk of vitamin B12 deficiency if they have a diet that is low in vitamin B12-containing foods - especially meat, dairy and fish.
- There is no evidence that vitamin B12 supplements are of any value in treating ME/CFS.
- Vitamin B12 supplements and B12 fortified foods will affect B12 blood test results. You should therefore discuss stopping supplementation with your doctor before being tested for Pernicious Anaemia or other malabsorption (such as Crohns, Coeliac, etc) causes of B12 deficiency. Pernicious Anaemia is an auto-immune disease which prevents vitamin B12 being absorbed through the digestion process and therefore requires treatment by injection.
- If you are going to take any sort of vitamin B12 supplement, please make sure that Pernicious Anaemia has been excluded as a possible cause of symptoms.



*Good dietary sources include meat, salmon, milk, eggs, some fortified breakfast cereals, and yeast extract – including Marmite.*

## WHAT IS VITAMIN B12?

Vitamin B12 is involved in energy production, tissue and cell repair, nerve health, and the production of red blood cells that carry oxygen around the body. So we all need a regular dietary supply, along with good intestinal absorption, of this vital vitamin.

## WHICH ARE BEST DIETARY SOURCES OF VITAMIN B12?

Good dietary sources include meat, salmon, milk, eggs, some fortified breakfast cereals, and yeast extract – including Marmite. Fruit, grains and vegetables do not contain vitamin B12.

A healthy balanced diet containing meat, poultry, seafood, and dairy produce should therefore be providing more than enough. And as the body stores several years supply of vitamin B12 in the liver it can take some time before any signs of deficiency appear.

Taking extra vitamin B12 in the form of over-the-counter supplements isn't therefore necessary or sensible – unless you are at increased risk of developing a deficiency or a deficiency of vitamin B12 has been identified.

## WHAT ARE THE SYMPTOMS OF VITAMIN B12 DEFICIENCY?

Vitamin B12 is required for a wide range of body functions. So it can cause an equally wide range of symptoms – some of which are related to nerve damage (neuropathy). The symptoms often develop gradually over a period of time and include several symptoms that can also occur in ME/CFS. These include:

- Fatigue and lack of energy
- Muscle weakness or clumsiness in the hands or feet
- Problems with balance and/or walking
- Visual disturbances



## WHAT ARE THE SYMPTOMS OF VITAMIN B12 DEFICIENCY?

- Problems with short-term memory, concentration, judgment, even confusion
- Paraesthesiae (pins and needles sensations in the skin) and numbness
- Headaches
- Palpitations (due to the anaemia)
- Tinnitus – hearing strange noises in the ears

Vitamin B12 deficiency should therefore form part of the clinical assessment and differential diagnosis of ME/CFS, especially where there is no clear infective onset or where prominent neurological symptoms are present.



*Neurological changes due to vitamin B12 deficiency may develop gradually in the absence of any clear changes in the blood profile.*

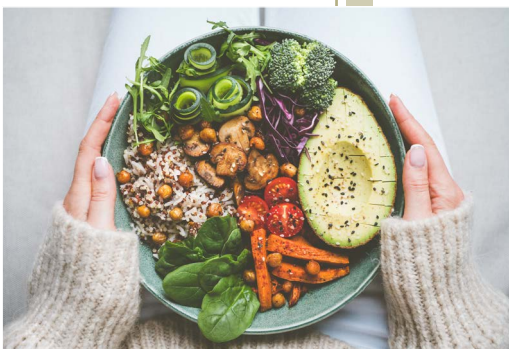
### Symptoms and signs that are not characteristic of ME/CFS include:

- Breathlessness due to anaemia
- Mood changes, including depression, anxiety and even psychosis
- Sore red tongue (glossitis)
- Mouth ulcers
- Loss of appetite and weight
- Pale yellow tinge to the skin
- Subtle deterioration in eyesight

A long-term and more severe deficiency of vitamin B12 can lead to serious neurological complications, including spinal cord degeneration (causing severe weakness and poor co-ordination) and heart failure. Neurological changes due to vitamin B12 deficiency may develop gradually in the absence of any clear changes in the blood picture.

Similar symptoms can also occur when there is a deficiency of an important nutrient called folate – which produces an anaemia with larger than normal red blood cells.

*Lack of vitamin B12 in the diet, although uncommon, this can occur in vegans and people who avoid meat, dairy and fish, or who are on some form of very restricted diet and do not take any foods that are fortified with vitamin B12 or a vitamin B12 supplement.*



## WHAT CAUSES VITAMIN B12 DEFICIENCY?

Overall, vitamin B12 deficiency affects around 5% of people aged 65 – 74 and 10% of people aged 75 or over. There are several ways in which people can develop vitamin B12 deficiency:

**Pernicious anaemia** is the commonest cause of vitamin B12 deficiency in the UK. It is more common in women around the age of 60, especially when they have other autoimmune conditions.

Pernicious anaemia is an autoimmune disease where the body's immune system produces harmful antibodies (autoantibodies) against its own tissues. Whilst there is some evidence to indicate that ME/CFS has an autoimmune component, there is no evidence that pernicious anaemia is more common in people with ME/CFS.

In the case of pernicious anaemia, the immune system produces antibodies against healthy cells in the stomach where a molecule called intrinsic factor, which helps vitamin B12 to be absorbed further down in the small intestines, is produced.

**Lack of vitamin B12 in the diet:** Although uncommon, this can occur in vegans and people who avoid meat, dairy and fish, or who are on some form of very restricted diet and do not take any foods that are fortified with vitamin B12 or a vitamin B12 supplement.

**Drugs:** A number of drugs can interfere with vitamin B12 absorption. These include colchicine, H2 receptor antagonists, metformin, pregabalin, primidone, proton pump inhibitors and topiramate. Oestrogen-containing oral contraceptives can reduce vitamin B12 levels – as can pregnancy.

It has recently been found that recreational use of nitrous oxide gas inactivates vitamin B12 in the body.

**Decreased absorption from the gastrointestinal tract:** This can be caused by previous abdominal surgery (e.g. gastrectomy – stomach removal) and intestinal conditions such as Crohn's disease and coeliac disease which can cause a decrease in absorption of vitamin B12 from the small intestine.

## WHAT CAUSES VITAMIN B12 DEFICIENCY?

**Functional vitamin B12 deficiency:** This is where there is a problem with proteins that transport vitamin B12 between cells. This can also cause neurological complications involving the spinal cord.

### Vitamin B12 in vegan and plant-based diets

**Information from Sue Luscombe, MEA professional adviser on diet and nutrition**



Vegan and plant-based diets are growing in popularity and can be very healthy. However, care needs to be taken as vitamin B12 is only found in animal products and therefore is not naturally present in a vegan diet. The only way to

ensure a reliable intake if you are on a Vegan or plant-based diet is to take fortified foods and supplements.

#### ■ Fortified foods

Vitamin B12 is added to some alternatives to milk products, vegan spreads, nutritional yeast flakes, yeast extracts and breakfast cereals.

Eat these foods at least twice a day.

#### ■ Supplements

Aim for a daily intake of at least 3mcg (micrograms) by taking at least 10mcg daily or at least 2000mcg weekly. The higher figure for a weekly supplement by the way is due to poor absorption of a single dose, hence why so much more needed).

The Vegan Society website has lots of help on how to achieve this:

<https://tinyurl.com/uwvhcjyc>

## HOW IS VITAMIN B12 DEFICIENCY DIAGNOSED?

Vitamin B12 deficiency results in the bone marrow producing abnormal blood cells that are larger than normal – megaloblastic cells. These red blood cells do not work as efficiently as normal red cells. The resulting anaemia is called a macrocytic (large cell) anaemia. However, it's important to note that vitamin B12 deficiency can occasionally occur without evidence of anaemia or macrocytosis.

Blood tests measure what is called total B12 (serum cobalamin) and active B12 (serum holotrans cobalamin). The most commonly used test is total B12 – which measures both active and inactive B12. The active B12 test is more accurate because it measures the amount of vitamin B12 that can be taken up and used by the body.





*The MEA receives regular feedback from people who feel that using vitamin B12 has been beneficial and there are also some doctors who believe it is effective.*



## HOW IS VITAMIN B12 DEFICIENCY DIAGNOSED?

Second line tests, where use and availability are limited, include plasma methylmalonic acid and plasma homocysteine. Testing for intrinsic factor antibody can help to confirm the diagnosis of an autoimmune disease process.

The level of folate, which causes similar symptoms, should be checked at the same time to exclude the possibility of co-existent folate deficiency anaemia .

## IS THERE ANY EVIDENCE OF VITAMIN B12 DEFICIENCY IN ME/CFS?

At present, there is no sound scientific evidence to demonstrate that vitamin B12 deficiency is present in ME/CFS.

## IS THERE ANY EVIDENCE THAT VITAMIN B12 IS A SAFE AND EFFECTIVE TREATMENT FOR ME/CFS?

As there is no sound evidence of vitamin B12 deficiency in ME/CFS, and no evidence from a good-quality, placebo-controlled clinical trial to show that vitamin B12 is an effective form of treatment for ME/ CFS, this is not a form of treatment that can be recommended.

However, there has been some feedback from a research group in Sweden. They reported that in a survey of 38 ME/CFS patients who had been receiving vitamin B12 injections in combination with folic acid at least once a week for six months, 15 reported a good response and 23 reported a mild response.

**Abstract:** <https://tinyurl.com/4vedvs2d>

The MEA receives regular feedback from people who feel that using vitamin B12 has been beneficial and there are also some doctors who believe it is effective. The MEA has therefore discussed the possibility of funding a clinical trial that would assess the safety and efficacy of assessing the use of a vitamin B12 supplement in ME/CFS.

## IS THERE ANY EVIDENCE THAT VITAMIN B12 IS A SAFE AND EFFECTIVE TREATMENT FOR ME/CFS?

In the NICE guideline on ME/CFS, vitamin supplements are not recommended as being necessary for people with ME/CFS. So most doctors are reluctant to prescribe vitamin B12 injections to people with ME/CFS in our current state of knowledge – unless there are sound reasons for doing so.



*Most doctors are reluctant to prescribe vitamin B12 injections to people with ME/CFS in our current state of knowledge – unless there are sound reasons for doing so.*

Vitamin B12 injections do not normally produce any serious side-effects. Minor side-effects can include fever, headache, nausea and dizziness.

However, it is really important to make sure that a diagnosis of pernicious anaemia has been excluded before undertaking any form of self-treatment with vitamin B12. This is because some symptoms of pernicious anaemia can overlap with ME/CFS and, if pernicious anaemia is not properly treated, this could cause permanent and serious damage to the nerves in the spinal cord – a condition called sub-acute combined degeneration of the spinal cord.

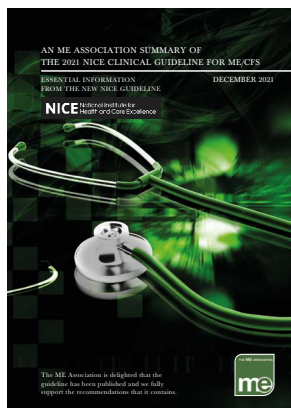
## HOW IS VITAMIN B12 DEFICIENCY TREATED?

This will depend on the cause. If there is a lack of vitamin B12 in the diet, vitamin B12 tablets in conjunction with increasing the amount of good dietary sources of vitamin B12.

If there is a problem with intestinal absorption, as happens with pernicious anaemia, then vitamin B12 has to be given by an injection containing hydroxocobalamin – which is retained in the body longer than cyanocobalamin. Tablets or mixtures cannot be absorbed in the case of pernicious anaemia.

Pernicious anaemia is a lifelong condition that can cause serious neurological problems if untreated or not properly treated. So treatment with injections has to be for life. After the initial course of treatment injections are then normally given every three months. If folate deficiency is also identified, folic acid tablets are prescribed.





### **NICE Guideline on ME/CFS: An ME Association Summary**

This booklet is recommended reading. It lets you know what to expect from the NHS and social care services with regard to symptom recognition, diagnosis, management, referral, and ongoing care and support. It can be downloaded free from our website:

### **NICE Guideline on ME/CFS: An ME Association Summary**



## **FURTHER INFORMATION ON VITAMIN B12 AND PERNICIOUS ANAEMIA**

The NICE guideline on vitamin B12 describes how people should be assessed and managed who have a blood test that indicates varying degrees of vitamin B12 deficiency:

<https://www.nice.org.uk/guidance/ng239>

Information about blood tests for Vitamin B12:

<https://tinyurl.com/bp7vvr2v>

Information about pernicious anaemia and sub-acute combined degeneration of the spinal cord:

<https://tinyurl.com/3hfc6ucu>

NICE do not recommend the use of vitamin B12 in ME/CFS, or as a treatment for undiagnosed fatigue. This has led to disciplinary action by the GMC:

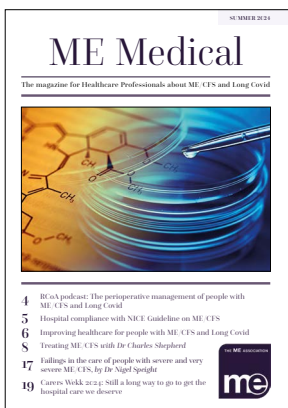
<https://tinyurl.com/5y9yaw6s>

Pernicious Anaemia Society:

<https://tinyurl.com/y2sd9fg6>



*“Thank you for producing such a helpful magazine. The standard is consistently high and each edition is interesting and varied. I need all the help I can get and this magazine is consistently encouraging, realistic, and helpful.”*



## THE ME ASSOCIATION

*Changing attitudes and improving lives...*

■ **COMMUNITY:** We provide a safe and welcoming community for people affected by ME/CFS and Long Covid who come together and benefit from sharing their experiences. We provide membership, an essential support service, excellent website resources and we host engaging discussions on the most popular social media channels. Knowing that you are not alone can be a great comfort and we are happy to answer your questions and share helpful tips.

■ **MEMBERSHIP:** We put the interests of members at the heart of everything we do. Your subscription means that we can support more people, campaign more effectively and fund more medical research. Members receive the exclusive ME Essential magazine which carries the latest news, medical information, personal stories, and feature articles. **Join us today!**

■ **SUPPORT:** ME Connect is the charity’s support and information service. We listen and we understand. We provide a personalised service and we’re here when you need us most. Most of us have personal experience of these medical conditions, or care for a loved one that does. We are here Monday to Friday 10am - 6pm (late night until 9pm on Thursdays) and at weekends, Saturday and Sunday 10am - 12 noon and 7pm - 9pm. We’re ready and waiting to take your call, answer your email or respond to your message.

■ **INFORMATION:** We produce reliable and timely information written by topic experts and have the **largest range of literature covering all aspects of life with ME/CFS and Long Covid**. We can show you how to recognise and manage symptoms, to get an accurate diagnosis, a referral to specialists, and to obtain the healthcare that you deserve. We also provide an **e-newsletter** and free access on the website to **Medical Matters** and other relevant information.

■ **RESEARCH:** We fund medical research via the **Ramsay Research Fund** and are especially interested in research that can find diagnostic markers, causes, and treatments. We support the UK ME/CFS Biobank and the Manchester Brain Bank, and have invested over £1m in medical research in the last 10 years.

■ **MEDICAL EDUCATION:** We arrange training for healthcare professionals, offer a medical magazine, ME Medical, and are working with the Government, NHS, Royal Colleges of Medicine, and Local Authorities to implement the recommendations from the 2021 NICE Clinical Guideline on ME/CFS – the successful result of 14 years lobbying and hard work.

*“The MEA is doing exactly what it said it would by providing support, actively lobbying for recognition, improvements to health and social care, and funding biomedical research.”*



## THE ME ASSOCIATION

*Changing attitudes and improving lives...*

■ **LOBBYING:** We campaign to raise awareness and bring about positive change. We believe in collaboration and work with the NHS and social care services, the Department of Health and Social Care, the British Association of Clinicians in ME/CFS (BACME), Forward-ME, the ME Research Collaborative (MERC), DecodeME, the All-Party Parliamentary Group (APPG) on ME, Physios4ME, the Chronic Illness Inclusion project (CII), Hidden Disabilities Sunflower, and Long Covid initiatives.

■ **HEALTH & SOCIAL CARE:** The charity works with healthcare providers to successfully implement the NICE Guideline recommendations on ME/CFS and Long Covid to ensure that everyone receives the very best healthcare, wherever they live in the UK. We want well-trained healthcare professionals providing excellent services because timely intervention can lead to better health outcomes and improved quality of life.

■ **DONATIONS:** Donations: In order to help more people and invest in medical research we depend on your generosity. If you feel able to make a donation or want to raise funds in other ways, please get in touch with the fundraising team: [fundraising@meassociation.org.uk](mailto:fundraising@meassociation.org.uk) or you can **make a direct donation via the website.**

### WHAT ARE ME/CFS AND LONG COVID?

We answer key questions about these medical conditions and compare similarities and differences. You'll also find the NICE Guidelines reproduced in full in an easy to use **database**.

### MEDICAL MATTERS

**Medical Matters** is an easy to use online supplement to the more detailed literature. The same topic experts provide answers to commonly asked questions.

### NHS REFERRAL SERVICES

If you need to locate an ME/CFS specialist service or Long Covid Clinic then we can help. We have listed all secondary care referral services in an easy to use **database**.



# ME CONNECT

The Support and Information Service for people affected by ME/CFS/PVFS and Long Covid

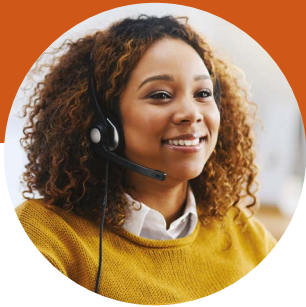


**Freephone**  
**0800 538 5200**

Monday to Friday 10am - 6pm  
(Late night until 9pm on Thursdays)

Saturday & Sunday  
10am - 12 noon & 7pm - 9pm

Contact ME Connect  
**3 WAYS TO GET IN TOUCH:**  
by phone, email  
or social media private message



### HERE TO LISTEN

We are here to listen, validate and empathise with any issues you might be facing.



### VITAL SUPPORT

We are here to help you reach an informed decision.



### SAFE ENVIRONMENT

We provide a safe, confidential and understanding environment where you can be heard and understood.

*We're here for you!*



[MEConnect@meassociation.org.uk](mailto:MEConnect@meassociation.org.uk)



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