

## Vitamin B12 or folate deficiency, Anaemia

### Introduction

There are several different types of anaemia and each one has a different cause

### Blood

Blood contains a clear fluid called plasma which contains three different types of cells:

white blood cells - part of the body's immune system and fight infection

red blood cells - carry oxygen around the body in a substance called haemoglobin

platelets - help blood to clot

### Haemoglobin

Haemoglobin transports oxygen in the blood. As blood passes through the lungs, the haemoglobin pulls in oxygen molecules and releases carbon dioxide molecules.

After moving away from the lungs, haemoglobin delivers oxygen molecules to the body's tissue and absorbs excess carbon dioxide molecules to take back to the lungs.

### Bone marrow

Red blood cells, which contain haemoglobin, are produced in the bone marrow (found inside the larger bones). Millions of new cells are produced every day to replace old cells that break down.

Vitamin B12 deficiency anaemia or folate deficiency anaemia develops when a lack of vitamin B12 or folate causes the body to produce abnormally large red blood cells that cannot function properly.

The main symptoms of vitamin B12 deficiency or folate deficiency anaemia are:

tiredness

lethargy (lack of energy)

You should see your DOCTOR if you have persistent tiredness or lethargy. They will usually be able to diagnose anaemia based on your symptoms and the results of a blood test.

## Anaemia

There are several different types of anaemia, and each one has a different cause. This topic focuses on anaemia caused by a lack of vitamin B12 or folate in the body.

It also covers pernicious anaemia, which is the most common cause of vitamin B12 deficiency. Read more about the causes of vitamin B12 or folate deficiency anaemia.

For information about anaemia that develops when the body does not contain enough iron, read iron deficiency anaemia.

## Vitamin B12 and folate

Vitamin B12 and folate work together to help the body produce red blood cells. They also have several other important functions:

vitamin B12 helps to keep the nervous system (brain, nerves and spinal cord) healthy

folate is important for pregnant women because it reduces the risk of birth defects in unborn babies

Vitamin B12 is found in:

meat

eggs

dairy products

The best source of folate is green vegetables such as:

broccoli

Brussel sprouts

peas

## Treating vitamin B12 deficiency anaemia

Most cases of vitamin B12 and folate deficiency are easily treated.

Supplements of vitamin B12 are usually given by injection at first. Then, depending on whether your B12 deficiency is related to your diet or not, you will either require B12 supplement tablets between meals or regular

further injections. These treatments may be required for the rest of your life.

Folic acid tablets are used to restore folate levels, which usually need to be taken for four months.

Improving your diet can prevent the condition returning, depending on the underlying cause of your vitamin B12 or folate deficiency.

Read more information about how vitamin B12 or folate deficiency anaemia is treated.

In rare cases vitamin B12 or folate deficiency may lead to complications, such as problems with the heart, lungs and nervous system and increase your risk of infertility. However, most of these complications can be treated.

Who is affected?

Both vitamin B12 deficiency and folate deficiency are more common in older people, affecting around 1 in 10 people above the age of 75. Vitamin B12 deficiency is rare in younger people, although those who follow a strict vegan diet may be more at risk.

Symptoms of vitamin B12 or folate anaemia

Symptoms of each type of anaemia vary depending on the underlying cause of the condition.

However, there are some general symptoms associated with all types of anaemia. These include:

fatigue (extreme tiredness)

lethargy (lack of energy)

breathlessness (dyspnoea)

faintness

headache

tinnitus (the perception of a noise in one or both ears, or inside your head, which comes from inside your body; for example, a ringing in your ears)

loss of appetite

Vitamin B12 deficiency

If you have anaemia caused by a vitamin B12 deficiency, you may have symptoms listed above, as well as:

a yellow tinge to your skin

a sore and red tongue (glossitis)

ulcers inside your mouth

an altered or reduced sense of touch

a reduced ability to feel pain

a change in the way that you walk and move around

disturbed vision

irritability

depression – feelings of extreme sadness that last for a long time

psychosis – a condition that affects your mind and changes the way you think, feel and behave

dementia – a decline in your mental abilities, such as memory, understanding and judgement

Folate deficiency

As well as general symptoms of anaemia, a folate deficiency may also cause:

loss of sensation, such as a reduced sense of touch or pain

muscle weakness

depression

### Causes of vitamin B12 or folate deficiency anaemia

Vitamin B12 deficiency and folate deficiency can be caused by a number of things that affect the body's ability to produce fully functioning red blood cells (cells that carry oxygen around the body).

Some of these are described below.

#### Vitamin B12 deficiency anaemia

##### Pernicious anaemia

Pernicious anaemia is the most common cause of vitamin B12 deficiency in the UK.

Pernicious anaemia is an autoimmune condition that affects your stomach. An autoimmune condition means your immune system (the

body's natural defence system that protects against illness and infection) attacks your body's healthy cells.

Vitamin B12 is absorbed into your body through your stomach. A protein called intrinsic factor attaches itself to vitamin B12 so it can be absorbed from food you eat.

Pernicious anaemia causes your immune system to attack the cells in your stomach that produce the intrinsic factor. This means your body cannot absorb vitamin B12 which causes a deficiency.

The exact cause is not known, but certain things increase your risk of developing pernicious anaemia, including:

being 60 years of age – pernicious anaemia is most common at this age

being female – pernicious anaemia affects slightly more women than men

having a family history of the condition – nearly a third of people with pernicious anaemia also have a family member with the condition

having another autoimmune condition, such as Addison's disease or vitiligo – there is an association between pernicious anaemia and other autoimmune conditions

#### Diet

The body usually stores enough vitamin B12 to last approximately two to four years. However, it is important to have vitamin B12 in your diet to ensure the store is kept at a healthy level.

A diet that includes meat, fish or dairy products usually provides enough vitamin B12. People who may not have enough vitamin B12 in their diet include vegans (people whose diet only contains food from plants) or those who have a very poor diet for a prolonged period of time.

#### Conditions affecting the stomach

Some stomach conditions or stomach operations can prevent the absorption of enough vitamin B12. For example, a gastrectomy (a surgical procedure where part of your stomach is removed) increases your risk of developing vitamin B12 deficiency anaemia.

#### Conditions affecting the intestines

Some conditions that affect your intestines (part of the digestive system) stop you from absorbing as much vitamin B12 as normal. For example, Crohn's disease (a long-term condition that causes inflammation of the

lining of the digestive system) can sometimes result in your body not having enough vitamin B12.

#### Medication

Some types of medicine can reduce the amount of vitamin B12 in your body. For example, proton pump inhibitors (PPIs) (a medication that treats indigestion) can make a vitamin B12 deficiency worse. PPIs inhibit the production of stomach acid, needed to release vitamin B12 from food you eat.

Your DOCTOR will be aware of medicines that can affect your vitamin B12 levels, and will monitor you if they think it necessary.

#### Folate deficiency anaemia

Folate is a water-soluble vitamin (it dissolves in water), which means your body is unable to store it for long periods of time. Your body's store of folate is usually enough to last four months. This means you need folate in your daily diet to ensure your body has sufficient stores of the vitamin.

Like vitamin B12 deficiency anaemia, folate deficiency anaemia can develop for a number of reasons. Some are described below.

#### Diet

Some people do not have enough folate in their daily diet. This may be because:

they have recently changed their diet – for example, to lose weight  
their diet is not healthy and balanced

#### Malabsorption

Sometimes your body may be unable to absorb folate as effectively as it should. This is usually the result of an underlying condition affecting your digestive system, such as Coeliac disease.

#### Excessive urination

You may lose folate from your body if you urinate frequently. This can be caused by an underlying condition that affects one of your organs, such as your kidneys or liver.

The following can make you urinate frequently:

congestive heart failure – where the heart is unable to pump enough blood around the body

acute liver damage – which often occurs as a result of drinking excessive amounts of alcohol

long-term dialysis – where a dialysis machine filters waste products from the blood

#### Medication

Some types of medicine reduce the amount of folate in your body, or make the folate harder to absorb. Your DOCTOR will be aware of medicines that can affect your folate levels and will monitor you if they feel it necessary.

#### Other causes

Sometimes, your body requires more folate than normal. This can cause folate deficiency because you cannot meet your body's demands for the vitamin. Your body may need more folate than usual when you:

are pregnant

have cancer

have a blood disorder, such as sickle cell anaemia (an inherited disorder that causes your blood cells to change shape)

are fighting an infection or health condition that causes inflammation (redness and swelling)

Premature babies (babies born before week 37 of the pregnancy) are also more prone to developing folate deficiency anaemia because their developing bodies cannot meet the demand for the folate vitamin.

#### Pregnancy

If you are pregnant or planning to get pregnant, take a daily supplement of 0.4mg of folic acid until you are 12 weeks pregnant. This will ensure both you and your baby have enough folate, and will help your baby grow and develop.

Folic acid tablets are available with a prescription from your DOCTOR or you can buy them over-the-counter from:

pharmacies

large supermarkets

health food stores

If you are pregnant and also have another condition that may increase your body's need for folate, such as those mentioned above, your DOCTOR will monitor you closely to prevent you from becoming anaemic.

In some cases, you may need a higher dose of folic acid. For example, if you have diabetes (a long-term condition caused by too much glucose in the blood) you should take a 5mg supplement of folic acid instead of the standard 0.4mg.

## Diagnosing vitamin B12 or folate deficiency anaemia

A diagnosis of vitamin B12 or folate deficiency anaemia can usually be made based on your symptoms and the results of a blood test.

A full blood count will be made which measures different types of blood cells in the sample.

In particular, your DOCTOR will check:

whether you have a lower level of haemoglobin than normal

whether your red blood cells are larger than normal

how much vitamin B12 is in your blood

how much folate is in your blood

If your test results indicate you are deficient in either vitamin B12 or folate, it will help determine which type of anaemia you have.

Further tests may be needed to establish the underlying cause of your deficiency and determine the most appropriate treatment.

## Referral

In some circumstances, you may be referred to a specialist.

### Haematologist

A haematologist is a doctor who specialises in treating blood conditions.

It's likely you will be referred to a haematologist if you have vitamin B12 or folate deficiency anaemia and are pregnant.

You will also be referred to a haematologist if you have symptoms that suggest that your nervous system (the brain, nerves and spinal cord) has been affected. These symptoms may include:

a reduced or altered sense of touch and pain

a change in your vision

an inability to control your muscles

### Gastroenterologist

A gastroenterologist is a doctor who specialises in conditions that affect the digestive system. You may be referred to a gastroenterologist if your DOCTOR suspects you do not have enough vitamin B12 or folate because your digestive system is not absorbing it properly.

#### Dietitian

A dietitian is a healthcare professional who specialises in nutrition. They can give advice about your diet.

You may be referred to a dietitian if you have vitamin B12 or folate deficiency thought to be caused by a poor diet. The dietitian can devise a personalised eating plan for you to increase the amount of vitamin B12 or folate in your diet.

### Treating vitamin B12 or folate deficiency anaemia

The treatment for vitamin B12 or folate deficiency anaemia will depend on what is causing the condition.

Different treatments are outlined below.

#### Vitamin B12 deficiency anaemia

Vitamin B12 deficiency anaemia is usually treated with injections of vitamin B12. The vitamin is in the form of a substance known as hydroxocobalamin.

At first you will have injections every other day for two weeks, or until your symptoms have stopped improving. Your DOCTOR or nurse will give you the injections.

After the initial treatment, your dosage will depend on whether the cause of your vitamin B12 deficiency is related to your diet or not. The most common cause of vitamin B12 deficiency is pernicious anaemia.

Read more about the causes of vitamin B12 or folate deficiency.

#### Diet related

If your vitamin B12 deficiency is caused by a lack of the vitamin in your diet, you may be prescribed vitamin B12 tablets to take every day between meals. Alternatively, you may need to have an injection of hydroxocobalamin twice a year.

People who find it difficult to get enough vitamin B12 in their diets, such as vegans (people whose diet only contains food from plants), may need

vitamin B12 tablets for life. People with vitamin B12 deficiency caused by a poor diet over a long period of time may have their tablets stopped by their DOCTOR once their vitamin B12 levels have returned to normal and their diet has improved. However, it is rarer for a non-vegan to experience vitamin B12 deficiency.

Good sources of vitamin B12 include:

meat

salmon

milk

eggs

If you are a vegetarian or vegan, or are looking for alternatives to meat and dairy products, there are other foods that contain vitamin B12, such as:

some fortified breakfast cereals

some soy products

You can check the nutritional labels of these foods to see how much vitamin B12 they contain.

Not diet related

If your vitamin B12 deficiency is not caused by a lack of vitamin B12 in your diet, you will usually need to have an injection of hydroxocobalamin every three months for the rest of your life.

If you have had neurological symptoms (symptoms that affect your nervous system, such as an altered sense of touch) because of vitamin B12 deficiency, you will be referred to a haematologist (a doctor who specialises in blood conditions). You may need to have injections every two months. Your haematologist will advise on how long you need to keep taking the injections.

If you need replacement injections of vitamin B12, hydroxocobalamin is preferred to cyanocobalamin in the UK. This is because hydroxocobalamin stays in the body longer.

If you need regular injections of vitamin B12, cyanocobalamin will need to be given once a month, while hydroxocobalamin can be given every three months.

As a result of this, cyanocobalamin injections are not recommended and not routinely available on the NHS. However, if you need replacement tablets of vitamin B12, these will be cyanocobalamin.

### Folate deficiency anaemia

To treat folate deficiency anaemia, your DOCTOR will usually prescribe daily folic acid tablets to build up your folate levels. They may also give you dietary advice so you can increase your folate intake.

Most people will need to take folic acid tablets for about four months. However, if the underlying cause of your folate deficiency anaemia is persistent, you may have to take folic acid tablets for longer, and maybe for life.

Before you start taking folic acid, your DOCTOR will check your vitamin B12 levels to make sure they are normal. This is because folic acid treatment can sometimes improve your symptoms so much that it masks an underlying vitamin B12 deficiency. If a vitamin B12 deficiency is not detected and treated, it could affect your nervous system (brain, nerves and spinal cord).

### Monitoring your condition

To ensure your treatment is working, your vitamin B12 or folate levels will need to be closely monitored.

Around 10 days after starting treatment, you will need a blood test to check your vitamin B12 or folate levels are starting to rise. You will need another blood test after approximately eight weeks to confirm your treatment has been successful.

If you have been taking folic acid tablets, you may be tested again once the treatment has finished (usually after four months).

Most people who have had a vitamin B12 or folate deficiency will not need further monitoring unless their symptoms return, or their treatment is ineffective. If your DOCTOR feels it is necessary, you may have to return for an annual blood test to see whether your condition has returned.

### Complications of vitamin B12 or folate deficiency anaemia

As most cases of vitamin B12 deficiency or folate deficiency can be easily and effectively treated, complications are relatively rare.

However, in some cases complications can develop, particularly if you have been deficient in vitamin B12 or folate for some time.

#### Anaemia complications

Anaemia, regardless of what it is caused by, can lead to heart and lung complications as the heart struggles to pump oxygen to the vital organs.

Adults with severe anaemia are at risk of developing:

tachycardia – an abnormally fast heart beat

heart failure – where your heart does not pump blood around your body very efficiently

#### Vitamin B12 deficiency complications

A lack of vitamin B12 can cause the following complications:

##### Nervous system

A lack of vitamin B12 can affect your nervous system (the brain, nerves and spinal cord). For example, you may experience:

vision problems

memory loss

paraesthesia (pins and needles) – a prickling or tingling feeling in the arms, legs, hands or feet

ataxia – the loss of physical coordination, which can affect your whole body and cause difficulty speaking or walking

##### Fertility

Vitamin B12 deficiency can sometimes lead to temporary infertility (an inability to conceive).

##### Neural tube defects

If you are pregnant, not having enough vitamin B12 can increase the risk of your baby developing a neural tube defect. Neural tube defects affect your baby's growth and development. Examples of neural tube defects include:

spina bifida – where the baby's spine does not develop properly

anencephaly – where the baby's brain and skull bones do not develop properly

## Folate deficiency complications

A lack of folate can cause complications, some of which are outlined below.

### Fertility

As with a lack of vitamin B12, a folate deficiency can also affect your fertility. However, effects are only temporary and can be reversed by using vitamin supplements.

### Cardiovascular disease

Research has shown a lack of folate in your body may increase your risk of cardiovascular disease. Cardiovascular disease is a term that describes a number of health conditions that affect:

your heart

your blood vessels

the way blood circulates (flows) around your body

### Cancer

Research has shown folate deficiency can be linked to some cancers, such as stomach cancer. A lack of folate is never the sole cause of a cancer developing, but it may be a contributory factor.

### Neural tube defects

As with a vitamin B12 deficiency, a lack of folate can also affect your baby's growth and development in the womb (uterus). This increases the risk of neural tube defects developing in the unborn baby, such as spina bifida.

### Premature birth

As well as affecting your baby's growth, a lack of folate during your pregnancy may also increase the risk of your baby being born prematurely (before week 37 of the pregnancy).