



# Vitamin B12 Test

RESULT REPORT

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## 1 Your individual result report

Patient	<del>John Doe</del> Max Mustermann	Sample number	DTKGN1885 / P035861
Born on	12.02.2016	Receipt	27.09.2016
Weight	192 lb	Issue	27.09.2016

### ~~John Doe~~ Max Mustermann

As per your request, we measured your vitamin B12 level. For this purpose, we checked the concentration of the active vitamin B12 - the so-called holotranscobalamin (holoTC) - in your blood. This form of vitamin B12 is the only form that can be absorbed by the body's cells.

As this laboratory parameter indicates an empty vitamin B12 store even before symptoms occur, it represents the earliest indication of a vitamin B12 deficiency.

**! Vitamin B12 is also called cobalamin  
due to the cobalt atoms  
of its chemical compound !**

In many people, the blood concentration of holotranscobalamin is below the normal value of >50 picomol per litre (pmol/l) due to their diet, life situation or underlying diseases.

This document has been created digitally and is valid without a signature.

If you would like a personal consultation by our nutritional experts with regard to your test results or if you have any general questions, please contact us either via mail to [support@cerascreen.co.uk](mailto:support@cerascreen.co.uk) or by dialing 020 36952395.

**Your Cerascreen Team**

## 2 Your test result

The holotranscobalamin level of your capillary blood is 60,00 pmol/l.

Holotranscobalamin concentration	Meaning
< 35 pmol/l	Vitamin B <sub>12</sub> stores are empty
35-50 pmol/l	Vitamin B <sub>12</sub> stores are almost empty
> 50 pmol/l	<b>Vitamin B<sub>12</sub> stores are sufficiently full</b>

As you can see from the above table, your vitamin B12 stores are sufficiently full. You should try to keep your holotranscobalamin value in the normal range of >50 pmol/l to maintain a good supply of cobalamin.

**Please note that the reference values are valid for adults only.**

## 3 How to reach optimal vitamin B12 blood levels

To maintain this good level, we recommend a diet with foods rich in cobalamin that permanently ensure the supply of vitamin B12. You can find more information on this in chapter 9.

It is worthwhile checking the holotranscobalamin level twice a year especially if there are changes in your life circumstances or your state of health. In this way, you can recognise a decreasing blood level in time and you have enough time to take countermeasures.

An excess of vitamin B12 is not harmful, as it is a water-soluble vitamin and thus excreted via the kidneys in case of an excess. Nevertheless, the kidneys are subject to some strain by this excretion, which means you should not overdo things. A daily intake of 500 µg vitamin B12 is sufficient to counterbalance this deficiency.

## 4 Vitamin B12 products

### What makes a good supplement?

- active form should be contained
- almost no or only few additives
- suitable for many consumers
- beneficial ingredients
- presentation in capsules
- tasteless



In a good product, the vitamin should be present in the active form. This means that it doesn't need to be processed by the body and is immediately effective. The active forms of vitamin B12 are methylcobalamin and adenosylcobalamin. Thus, the body can exploit the vitamin quickly. In case you don't take in the active form of vitamin B12 which comes upon an indigestion, then the vitamin B12 cannot be effective at all. In case of a good absorption, this is called a "high bioavailability", as the substance is quickly available to the body.

The supplement should contain as few additives as possible so that it can work effectively and is not impaired in any way.

It should be suitable for as many consumers as possible so that everybody has the chance to optimize his vitamin level!  
Thus, it should be vegan, vegetarian, gluten-free and lactose-free. Otherwise, there should be alternatives for each group of consumers!

At best, the supplement contains substances that are beneficial for the absorption into the body. For vitamin B12, the combination with other vitamins B is favourable as they interact. This is especially the case for vitamin B12 and folic acid.

As tastes differ, a tasteless supplement is particularly attractive. The vitamin B12 should be presented in form of capsules or droplets. This makes the handling and dosage much easier than in form of tablets.

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## 5 What does the body need vitamin B12 for?

Vitamin B12 is a so-called essential vitamin. This means that the body can't produce it at all or only in negligible quantities. Only the human gut bacteria can produce it in small quantities. Without regular intake through the diet, the body's health can be affected.

Vitamin B12 as a coenzyme is contributing to many vital metabolic processes like e.g.

- DNA formation
- nerve protection and nerve regeneration
- cell division and cell respiration
- blood formation
- synthesis of messenger substances
- detoxification

In accordance with the functions of vitamin B12, symptoms of a deficiency can be deduced (see chapter 8).

## 6 How much vitamin B12 does the body need?

According to the "German Food Association" (DGE), the recommended daily dose of vitamin B12 is:

Group	Recommended daily intake*
Adults	3.0 µg
Pregnant women	3.5 µg
Breast-feeding mothers	4.0 µg

\*An actual vitamin B12 requirement of 1.5-2.0 µg is estimated.

These recommendations reveal that only about 50% of the supplied vitamin B12 can be processed by the organism. The amount processed is even lower for older persons. This loss is already taken into account for the recommendations.

In case of an increased oral intake of vitamin B12, the body can no longer absorb it. Then the following applies: the more vitamin B12 is taken in at one time, the lower the absorption rate.

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## 7 Reasons for a vitamin B12 deficiency

There can be different reasons for a cobalamin deficiency:

- an insufficient supply through the diet, as may be the case among vegetarians, vegans or malnourished people
- an increased consumption of vitamin B12 as with pregnant women and breastfeeding mothers
- an impaired absorption of cobalamin into the body due to underlying illnesses or intake of various medicines (interaction)

### 7.1 Inadequate intake of vitamin B12

#### Vegetarians and vegans

Vegetarians have a high risk of developing a vitamin B12 deficiency, as cobalamin is found almost exclusively in foods of animal origin. A vitamin B12 deficiency is frequent in vegetarians and depends on the form and duration of the vegetarian diet. In a study conducted with lacto- and lacto-ovo vegetarians, 73% had a reduced holotranscobalamin level of less than 35 pmol/l. In vegans, low holotranscobalamin values were even present in 90% of the individuals.

#### Malnourished and fasting individuals

An unvaried diet with insufficient cobalamin intake can lead to a deficiency of vitamin B12. A period of fasting or a reducing diet can also cause a cobalamin deficiency due to an inadequate total amount of food.

### 7.2 Increased consumption of vitamin B12

One explanation for an increased vitamin B12 consumption is that more cobalamin is consumed by the body than absorbed over a certain period of time. Reason for this can be major stress or a severe life crisis.

However, particular life circumstances like e.g. pregnancy or lactation can also lead to an increased requirement

#### Pregnant and breastfeeding women

During pregnancy, about 0.1-0.2 µg of cobalamin are transferred to the unborn child every day. As the B12 supply of the individual pregnant woman is not known and an oversupply is not harmful in contrast to an undersupply, the "German Food Association" (DGE) recommends a total additional intake of 0.5 µg daily. For breastfeeding mothers, the transfer of vitamin B12 to the infant is 0.4 µg and the recommendation for additional intake is 0.5 µg per day.

The security surcharge can also be regarded as a preventative measure to avoid potential undersupply.

If the breastfeeding mother does not take in enough vitamin B12 and the infant is thus not supplied with enough vitamin B12, this can lead to permanent development disorders.

### **Stressful situations**

Stressful situations can result in an increased demand for vitamin B12. Copious amounts of vitamin B12 are needed for the release of the stress hormones noradrenaline and serotonin. In addition, the blood flow in the digestive tract is lowered by stress, which is then reducing the metabolization of cobalamin.

Stress, in this context, means all types beginning from major mental and physical strain (physically demanding work and competitive sports) up to anxiety, lovesickness and grief or recurrent infections.



### **Toxins**

Contamination with toxins is also associated with a cobalamin deficiency. Particularly worth mentioning here is smoking, as vitamin B12 neutralizes the toxin cyanide present in smoke, which hence consumes vitamin B12. Detoxification of the nitrogen compounds occurring in general anaesthetics requires that much vitamin B12 that it doesn't take much to go from low storage levels to a manifest deficiency.

## **7.3 Malabsorption of vitamin B12**

The reason in this case is that the body cannot absorb and process enough vitamin B12 despite adequate intake. Such disorders in vitamin B12 absorption are relatively frequent especially in older people. For persons over 65 years of age, the deficiency is, therefore, present in 10% of individuals whereas approx. 30% of those over 80 are concerned. Already light inflammations of the stomach or bowel can lead to absorption disorders. Moreover, there are interactions with alcohol, coffee and many drugs. In these cases it is hardly possible to compensate for the deficit by dietary intake.

Owing to the complex metabolism of vitamin B12, the insufficiently high amount of vitamin B12 can lead not only to a deficiency but also various diseases of the digestive organs.

Owing to the complex metabolization of vitamin B12, not only an inadequate intake but also various intestinal diseases can lead to a deficiency. This especially concerns people with chronic gastritis or (partially) removed stomach, as thus the so-called intrinsic factor - the transport protein for vitamin B12 - cannot be produced in sufficient quantities. It enables the absorption of vitamin B12, causing a so-called functional vitamin B12 deficiency if it is produced insufficiently.

Also in case of intestinal inflammation and disorders such as Crohn's disease, tapeworms or threadworms, a Helicobacter pylori infection or bacterial overgrowth of the intestinal flora, the resultant disorders in the physiological mechanisms of the metabolization are also a cause of the vitamin B12 deficiency.



Liver diseases can also lead to an inadequate storage capacity and thus also cause a deficiency of vitamin B12.

Interactions and the resulting deterioration in the processing of vitamin B12 result from various medicines, drugs, alcohol and coffee consumption. Many different medicines can lead to such interaction - from diabetic medicines and psychiatric drugs through to contraceptives containing oestrogen. Ask your doctor or pharmacist.

#### **7.4 Conclusion**

If you belong to one of the above risk groups or have determined a deficiency by help of this test, you should check your vitamin B12 level regularly so that you can recognize a renewed undersupply in a timely manner and can take corresponding countermeasures.

If you still have sufficient reserves of vitamin B12, but belong to one of the risk groups, you can use the test to prevent a deficiency from arising in the first place. If you practice strict vegetarianism or veganism as a nutritional diet, you should test yourself regularly, in order to ensure that you, and possibly your unborn child, can have a healthy life.

### **8 What are symptoms of a vitamin B12 deficiency?**

An insufficient vitamin B12 intake doesn't make itself apparent immediately thanks to the storage facility of the liver and muscles. Only when the stores start to empty, do symptoms like fatigue, weariness or increased susceptibility to infections occur. Once the stores are exhausted, specific symptoms such as tingling and numbness in the arms and legs, neuralgia, anaemia, depression, signs of paralysis or coordination disorders begin. As mentioned in chapter 5, vitamin B12 is contributing to many vital metabolic processes and in accordance with these functions, symptoms of a deficiency can be deduced.

#### **Nerve disorders**

Cobalamin is of major importance for the protection of the nerve cells. A deficiency of vitamin B12 leads to a reduction of the insulation material surrounding the nerve fibres of the spinal cord. Owing to the resemblance with various neurological diseases and e.g. herniated discs, a vitamin B12 deficiency is often diagnosed very late here. The neurological symptoms can be:

- Nervousness and irritability
- Numb feeling or "pins and needles" (formication) in parts of the body through to severe pains in limbs
- Painful paraesthesia in the extremities (hands / arms / feet / legs)
- Fatigue
- Neurological disorders

- Depression

### **Anaemia / Weakness**

A deficiency of cobalamin leads to a reduced cell replication in the bone marrow, the part of the body where red blood cells are formed, and hence to a so-called pernicious anaemia, a special form of anaemia. Vitamin B12 is also involved in incorporating iron in the red blood cells. A reduction in oxygen and nutrient absorption leads to a general deficiency situation in the organism with the corresponding symptoms such as weakness and low immunity, exhaustion and tiredness.

### **Digestive disorders**

Vitamin B12 has a special function in the absorption capacity and metabolization of various nutrients. Hereby, a deficiency becomes apparent through lack of appetite, diarrhoea, constipation and inflammatory reactions in the mouth, stomach and intestinal area.

### **Further possible symptoms**

Diminished vision can also be a sign of a cobalamin deficiency.

The involvement of vitamin B12 in certain messenger substances and hormones means that psychic mental disorders like depression or even psychoses can also result.

Due to the role of cobalamin in energy metabolism, the latter is disrupted, leading to muscular weakness, exhaustion, fatigue and lack of concentration.

## **9 How to supplement vitamin B12**

### **9.1 Intake via vitamin B12 supplements**

To increase the vitamin B12 level and replenish the stores, both prescription and non-prescription supplements can be taken. These contain various forms and amounts of vitamin B12.

Diverse forms of supplements can be utilised for vitamin B12. The selection ranges from tablets and lozenges or capsules through to sprays and droplets as well as injections. Each form has its merits. Thus, for example, tablets and sprays can be easily administered, while capsules have a high bioavailability. The optimum form of administration can be found for every situation.

### **9.2 Vitamin B12 intake via injections**

In case of pronounced vitamin B12 deficiency or a lack of cobalamin due to absorption disorders, this vitamin can be administered via injections. These are carried out according to the physician's instructions.

It is meanwhile known that high doses of about 1000 µg of vitamin B12 taken orally - despite an absorption disorder - result in a sufficient coverage of needs.

### 9.3 Vitamin B12 intake through food

As already mentioned, vitamin B12 can primarily only be supplied via food of animal origin. No trace of vitamin B12 can be found in plant-based foods such as vegetables, fruit, legumes, herbs, nuts, cereals, amaranth, quinoa, rice and vegetable oils/fats. To provide sufficient cobalamin through food, it is advisable to know the content of vitamin B12 in individual foods.

An overdose is hardly possible, as the natural amounts of cobalamin in foods are not as high as in vitamin B12 preparations and if too much vitamin B12 is taken in it is excreted via the kidneys.

When preparing the foods, it must be kept in mind that vitamin B12 is very sensitive to heat and light. Thus meat loses a lot of its vitamin B12 when fried and likewise milk by heating.

An overview of foods with a high cobalamin content is provided below:

Food	Vitamin B <sub>12</sub> content in 100 g edible component
Beef liver	65.0 µg
Calf's liver	60.0 µg
Lamb's liver	35.0 µg
Caviar	16.0 µg
Oysters	14.5 µg
Liver sausage, fine	13.5 µg
Rabbit	10.0 µg
Liver dumplings	10.0 µg
Mackerel	9.0 µg
Herring	8.5 µg
Mussels	8.5 µg
Beef, lean	5.0 µg
Wild boar	5.0 µg
Trout	4.5 µg
Tuna	4.3 µg
Goose	4.0 µg
Ocean perch	3.8 µg
Pollack	3.5 µg
Camembert	3.1 µg
Emmentaler	3.1 µg
Lamb	3.0 µg
Duck breast	3.0 µg

Less cobalamin is contained in the following foods:

Food	Vitamin B12 content in 100 g edible component
Salmon	2.9 µg
Squid	2.5 µg
Pork cutlet	2.1 µg
Edamer, Parmesan,	2.0 µg
Veal, lean	2.0 µg
Pike	2.0 µg
Chicken egg yellow	2.0 µg
Gouda	1.9 µg
Chicken egg	1.8 µg
Plaice	1.5 µg
Minced meat	1.5 µg
Mortadella, salami	1.4 µg
Grilled sausage	1.3 µg
Mozzarella	1.3 µg
Pork, lean	1.0 µg
Cream cheese (min. 10% fat)	1.0 µg
Curd cheese	0.9 µg
Fish fingers	0.8 µg
Cottage cheese	0.7 µg
Anchovies	0.6 µg
Sheep's milk	0.5 µg
Chicken	0.4 µg
Cow's milk	0.4 µg
Yoghurt	0.4 µg
Sheep's milk (Feta)	0.4 µg
Chicken egg white	0.1 µg

As the above table reveals, the daily requirement for non-vegetarians who are not pregnant or breastfeeding can be covered very effectively with, for example, 100 grams chicken breast or 100 grams lamb.

Lacto-vegetarians who consume milk or milk products, can cover their daily requirement with a chicken egg, 100 grams curd cheese and 100 grams Mozzarella. Vegetarians who eat fish, can cover their daily requirement for instance with 100 grams salmon.

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