Food supplement with vitamins, trace elements, coenzyme Q10 and secondary plant substances (lycopene and lutein)

- For normal metabolic processes
- For the normal function of the immune system
- To protect cells from oxidative stress
CAREIMMUN® – a promise

Our CAREIMMUN® series was developed according to the most recent scientific knowledge and produced in compliance with the latest global standards – exactly the same high standards that we apply to our drug products for intensive care, oncology and chronic thyroid gland diseases.

The food supplements are exactly and correctly dosed, supplying your body with everything that it requires for basic care. We simultaneously avoid overdosing individual constituents, as can happen with many products of our competitors.

The entire CAREIMMUN® series contains vitamins, mineral nutrients and trace elements, in part even enzymes, which the body especially needs to meet today’s requirements. It goes without saying that all products are well-tolerated.

Please also remember that the best dietary supplement is no replacement for a well-balanced and diversified diet and a healthy life-style.
CAREIMMUN Basic® helps to cover the usual basic vitamin and trace element requirements. As supplement, Careimmun Basic® contains coenzyme Q10 and secondary plant substances.

Dietary supplements should not be used as a replacement for a well-balanced and diversified diet.

CAREIMMUN Basic® at a glance

- The essential vital substances in a capsule
- With coenzyme Q10 and secondary plant substances
- Increased vitamin D₃ content according to recommendation of the DGE (German Nutrition Association)
- Folic acid in the form of methyltetrahydrofolate
- Flexible administration options
- Without milk sugar, gluten, gelatin, yeast or preservatives
Dietary supplement with micronutrients and coenzyme Q10

CAREIMMUN Basic® is recommended for basic healthcare. The vitamin/trace element pellets in capsules contain coenzyme Q10 and secondary plant substances (lycopene and lutein, obtained from extracts from tomatoes and Tagetes erecta).

CAREIMMUN Basic®
• Supports the function of the immune system
• Reduces tiredness and fatigue
• Offers cell protection from oxidative stress
• Contributes to normal DNA synthesis
• Supports cell division or cell specialization
• Promotes energy metabolism
• Supports the functions of the nervous system
• Contributes to the preservation of the mucous membranes
• Provides skin, hair and teeth with micronutrients

“Multivitamin drug product” – excellently suited for the elderly

Older people benefit particularly from the coenzyme Q10, an active substance not found in competitive products, as well as a special form of folic acid called methyltetrahydrofolate.

Another advantage is the special coating of the pellets, which ensures that the capsules can be opened and the tiny pellets for instance sprinkled on food for ingestion. Thanks to optimal dosing of CAREIMMUN Basic®, only one capsule a day – taken with some liquid – is required for the daily support of the immune system.

The coloration of the pellets is based on the high coenzyme Q10 quantity in CAREIMMUN Basic®.
## What impacts do various micronutrients have?

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Where and how is CAREIMMUN Basic® effective?

- Immune system
- Protection from oxidative stress
- DNA synthesis
- Cell division
- Energy metabolism
- Skin
- Hair
- Teeth
- Mucous membranes
- Tiredness, weariness
- Nervous system
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Why CAREIMMUN Basic®?

**Optimal dosing**

Along with the daily basic supply of essential micronutrients, Careimmun Basic® provides nutritional supplements with the most important vitamins, minerals and trace elements in optimally dosed form.

**Increased Vitamin D₃ content**

The German Association of Nutrition (DGE) has recently increased the daily requirements of vitamin D₃ from 5 µg to 20 µg. CAREIMMUN Basic® therefore now contains 20 µg vitamin D₃.

**In addition, it contains Coenzym Q10 and carotenoids**

CAREIMMUN Basic® furthermore contains secondary plant substances, so-called carotenoids, extracts from tomatoes and Tagetes erecta, as well as the vitamin-similar substance coenzyme Q10.

**Folic acid in the form of methyltetrahydrofolate**

CAREIMMUN Basic® contains folic acid in the bioactive form of methyltetrahydrofolate. Up to 50% of people can only inadequately exploit folic acid. Methyltetrahydrofolate provides a sufficient secure supply.

**Flexible administration options**

CAREIMMUN Basic® provides the micro-nutrients in capsules containing little pellets. This has the advantage that the different micro-nutrients do not interact with each other and become inactivated. Another advantage is the special coating of the pellets, which ensures that the capsules can be opened and the pellets for instance can be scattered over food and ingested.

**Only one capsule per day – less effort**

Thanks to optimal dosing of CAREIMMUN Basic®, only one capsule a day – taken with some liquid – is required for the daily support of the immune system.

**Special galenic properties**

Another advantage is the special coating of the pellets, which ensures that the capsules can be opened and the pellets can for instance be scattered over food and consumed.

**Well-tolerated**

CAREIMMUN Basic® contains no milk sugar, gluten, gelatin, yeast, dyes, or preservatives. The coloration of the pellets is based on the coenzyme Q10 portion in CAREIMMUN Basic®.
Why CAREIMMUN Basic®?

- Optimal dosing
- Increased vitamin D₃ content
- In addition, contains coenzyme Q10 and carotinoids
- Folic acid in the form of methyltetrahydrofolate
- Flexible intake
- Only one capsule a day
- Special galenic properties
- Well-tolerated
A healthy and well-balanced diet

Food supplements are being increasingly viewed critically because trials have been published in which the supplementation of individual micronutrients have been associated with the increased incidence of various disorders. Simultaneously, there is the insistently repeated mantra saying that a healthy and well-balanced diet more than covers human requirements for vitamins, minerals and trace elements.

However, reality shows that most people cannot manage this healthy and well-balanced diet and therefore consume too few vitamins, trace elements and mineral nutrients. Particularly when the daily routine is so strenuous that the body requires more of these important substances, leaving less time and thought for consuming a healthy, well-balanced diet.

Human beings are adaptation artists

In the course of millennia, humans have adapted to the most diverse ecosystems, from the dusty dry wilderness to the icy landscape of the Arctic. This was possible because humans are omnivores and can survive on both a very meat-intensive as well as vegetable-rich diet. In Europe, for a long time it was a survival advantage to be able to digest milk and dairy products without problems, while in other parts of the world it was of no great importance, and accordingly in these regions a high percentage of the population cannot digest lactose contained in milk without complications.

The Mediterranean diet differs greatly from the traditional Japanese diet, but nevertheless scientific studies demonstrate that both forms of nutrition provide significant advantages to health and longevity.

Nutritional recommendations – more confusion than help

Meanwhile, most countries give recommendations for a healthy and well-balanced diet in the form of a food pyramid or a food cycle. But these recommendations are sometimes considerably different. At times fruits and vegetables are to account for the largest portion of one’s diet, sometimes cereal products. Moreover, some food pyramids assign foods to different groups and therefore also evaluate them differently, such as nuts. In Croatia, nuts are assigned to the sugar group, in Switzerland to the fats; in Spain and England, meat, fish, beans and eggs are collected together in a single protein group. Greece puts nuts together with olives and legumes in a separate group. Also foods consumed significantly more frequently are affected: beans, peas and lentils are grouped together with meat, vegetables, fruits or potatoes, depending on the country, whereby potatoes belong to the so-called homeless foods, because they can be found in many different categories.
Diet recommendations in Germany

The German Association of Nutrition (DGE) has meanwhile introduced a three-dimensional diet pyramid, which provides no information about daily recommended quantities (Fig. 1). The diet circle must be employed (Fig. 2) for this purpose.

Fig. 1

Diet recommendations in Germany

The German Association of Nutrition (DGE) has meanwhile introduced a three-dimensional diet pyramid, which provides no information about daily recommended quantities (Fig. 1). The diet circle must be employed (Fig. 2) for this purpose.
Does the DGE diet recommendation cover human micronutrient requirements?

The DGE diet circle provides weekly plans with proposals for balanced nutrition. According to the DGE, it covers the entire vitamin, mineral and trace element requirements.

Selenium intake on the average 30% too low

Taking the weekly plans for men and women as the base,* on average there is a daily selenium intake of 44.3 µg selenium per day for women and 48.6 µg selenium per day for men. The DGE recommends a daily selenium intake of 70 µg for men and 60 µg for women and is thereby 30% higher than the recommended selenium quantities achieved by the weekly plans.

DGE diet circle

1. Cereal, cereal products and potatoes
2. Vegetable and salad
3. Fruit
4. Milk and dairy products
5. Meat, sausage, fish and eggs
6. Oils and fats
7. Beverages


Fig. 2
The National Survey on Nutrition II (n=15,371) published in 2008 provides an overview of the micronutrient intake of Germans.

**Critical vitamins: vitamin D and folic acid**

For most vitamins, the daily supply corresponded to the recommended values. The exceptions were vitamin D and folic acid. 79% of men and 86% of women were below the recommended value for folic acid, whereby the percentage rose with increasing age. With the recommended 5 µg vitamin D per day, it dropped below 82% for men and 91% for women. Meanwhile the recommendation has risen to 20 µg, so that the percentage of underserved Germans probably rose to nearly 100%.

**Critical mineral nutrients and trace elements: iodine, iron and calcium**

With regard to minerals, the intake of iodine, iron and calcium is critical. The actual iodine intake is difficult to evaluate since this strongly depends on the quantity of consumed iodized salt. The iron intake for women of child-bearing age is problematical. However, additional iron should only be taken if there is a demonstrated iron deficiency. Surprisingly, calcium is also a critical nutrient in female adolescents between 14 and 18 years or in older men and women (65–80 years).

**What about selenium?**

Data about the daily selenium supply were not recorded in the National Survey on Nutrition II, with reference to the greatly fluctuating selenium levels in foods. Trials showed that the daily selenium intake was only 42 µg selenium for men and 30 µg selenium for women. The DGE recommends a daily selenium supply of 70 µg (men) and 60 µg (women).
Important trace elements for the immune system

Selenium

Selenium is an essential trace element that is included in a multitude of proteins essential to life, so-called selenoproteins. Sufficient quantities of selenoproteins cannot be formed without an adequate selenium intake. This leads to restricted oxidative protection. One of the primary tasks of selenoproteins is based on its antioxidative effect. Selenoproteins are furthermore essential for the protection and function of the thyroid gland. Also the immune system is dependent on an adequate selenium intake in order to provide optimal protection.

How frequent is a selenium deficit?

A selenium deficiency is very frequent in Germany and Europe. The latest numbers from a large-scale European study conducted in 2015 have confirmed the suboptimal supply of selenium in Europe. Moreover, there are significant differences between Middle, Southern and Northern Europe (77.4 DS. 79.8 DS. 87.2; p < 0.001). The mean selenium concentration in the serum in Europe lies at 85.6 µg/l and thus almost within the reference range, which begins at 80 µg/l selenium in serum. The average serum selenium concentration in Germany does not achieve the reference range with 74.3 µg/l for men and 73.2 µg/l for women.

What is the impact of a selenium deficit?

A long-term, massive selenium deficiency, such as has occurred in parts of China, leads to cardiomyopathy (Keshan disease) and osteoarthropathy (Kaschin-Beck disease). Additional selenium deficiency symptoms are tiredness, lack of vitality, hair loss and white coloration of the fingernails. Furthermore, a selenium deficit can lead to functional disorders of the liver, arthritis, loss of muscular strength and infertility. It restricts the function of the immune system as well as the thyroid gland, and increases the likelihood of cancer or cardiovascular disorder (Fig. 3). Not only the function of the thyroid gland is restricted, but a selenium deficit can also trigger a hypofunctional thyroid or hyperfunction.
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<td><strong>Brain</strong></td>
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<td>• Tiredness</td>
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<td>• Lack of vitality</td>
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<td><strong>Thyroid gland</strong></td>
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<td>• Hypothyroidism</td>
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<td>• Increased likelihood of a cardiovascular disorder</td>
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<td>• Loss of muscular strength</td>
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<td><strong>Bone</strong></td>
</tr>
<tr>
<td>• Arthritis</td>
</tr>
<tr>
<td><strong>Nails</strong></td>
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<tr>
<td>• White coloration of the nails</td>
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*Fig. 3*
Who has an increased risk of a selenium deficiency?

The risk for selenium deficiency can increase both by a limited intake as well as increased demand. The daily intake of selenium is significantly reduced for vegetarians, vegans, alcoholics, those affected with celiac disease and dialysis patients (Fig. 4). Also a strongly one-sided diet, such as patients with malabsorption, consume too little selenium. Increased selenium requirements can be shown in adipose women, patients with diabetes, kidney damage, bulimia, anorexia, diarrhea, indigestion and malabsorption.

Fig. 4: High-risk groups for a selenium deficiency.
Selenium – for the normal functioning of the immune system

Selenium, in its function as a part of selenoproteins, plays a significant role in inflammation and immunity. A sufficient selenium intake and thereby an adequate selenium level in the blood is important in order to both initiate and regulate the immune response, and prevent the body from an overshooting reaction as well as for chronic inflammation.\(^6\)

Selenium supports the lymphocyte function

Various trials have shown that a high selenium intake leads to an increased expression of antioxidant selenoproteins, which however does not decrease the level of ROS necessary to stimulate immune cells.\(^6\) The lymphocytes increase the mRNA expression of proteins involved in protein biosynthesis, after a six-week intervention with 100 µg selenium per day in the form of sodium selenite.\(^7\) This is probably the basis for increased selenoprotein production and improved lymphocytes function.\(^7\)

Selenium increases the expression of interleukin-2

The cytokine interleukin-2 (IL-2) plays a central role in immune response. IL-2 is a growth factor for T-cells and promotes the cytolysis activity of CD8+-T cells and natural killer cells. In addition, IL-2 modulates the differentiation of naive CD4+-T cells in T-helper cells 1 (TH1) and T-helper cells 2 (TH2).

A high selenium supplementation in the form of sodium selenite increases the expression of interleukin-2, a principle mediator of the immune system and its receptors.\(^8\) Due to autocrine and paracrine functions of interleukin-2, the proliferation capacity of immune cells increases. This trial also showed that a high selenium intake shifts the TH1/TH2 balance of the T-helper cells in the TH1 direction (Fig. 5).\(^8\) Selenium supplementation therefore promotes anti-viral immunity.
Dietary selenium modulates activation and differentiation of CD4+ T cells in mice through a mechanism involving cellular free thiols.


Dual impact of selenium on inflammation

Eikosanoids are important modulators of inflammation and immune response. The selenium level influences the synthesis and effect of these mediators on several levels (Fig. 6). An adequate selenium intake reduces pro-inflammatory eikosanoidal biosynthesis. These feedback loops moreover change within the signal cascade. The consequence is that selenium suppresses the proinflammatory eikosanoidal biosynthesis and raises the anti-inflammatory eikosanoidal production.

Highly reactive hydroperoxide intermediate products occur within the eikosanoidal metabolism. Antioxidative selenoproteins protect the cells from oxidative damage by ROS. Selenoproteins are furthermore able to control the activity of cyclooxygenase and lipoxygenase.
Dual impact of selenium on inflammation

Regulation of inflammation by selenium and selenoproteins: impact on eicosanoid biosynthesis.

Fig. 6
Zinc

Zinc is an essential trace element. Distributed over all organs, the human body contains about 2–4 grams. Zinc is primarily stored in bones, skin and hair, where up to 70% of the zinc is taken up. The rest can be found primarily in the liver, kidneys and muscles. After iron, zinc is the second most important metal in living organisms.

What function does zinc have in the body?

About 300 enzymes in our body require zinc. In order to function, zinc is important for numerous metabolic processes such as the production and degradation of carbohydrates, fats and proteins. Zinc also has an impact on:

• skin
• the immune system
• acid-base metabolism of the blood
• eyes
• the effect of different hormones (e.g. insulin, thyroid hormone, sex hormone, growth hormone)
• taste sensation

How frequent is a zinc deficit in Germany?

Zinc deficiency is a great worldwide health problem affecting about two billion people.\[^{10}\] According to an estimate of WHO, 9% of the population in Germany consume too little zinc per day. At first glance this seems like a low value. But compared to the numbers of other European countries, this number no longer appears so good. In France, 3.4% consume too little zinc per day, in Great Britain 4.6%, in Switzerland 4.9%, in Spain 5.4%, in Italy 5.8%, in Denmark 6.2% and in Austria 7.4%.\[^{11}\]

Who has an increased risk of a zinc deficiency?

In general, a well-balanced diet in Germany prevents zinc deficiency syndromes. Nevertheless, there are risk groups for a zinc deficit (Fig. 7). This includes seniors, convalescents, pregnant women and adipose people as well as professional athletes. Vegetarians and vegans are also threatened by a zinc deficit, since the daily zinc requirements are covered to almost 60% by animal food in Germany.
Risk factors for zinc deficiency

- One-sided diet
- Long-enduring diarrhoea
- Disorders*: e.g. AIDS, acne, allergies, diabetes, neurodermatitis, cancer, liver and infections
- Low consumption of food containing zinc**: e.g. vegetarians, vegans
- Excessive alcohol consumption
- Pregnancy and lactation
- Competitive athletics
- Growth

* e.g. AIDS, acne, allergies, diabetes, neurodermatitis, cancer, liver and infections
** e.g. vegetarians, vegans

Fig. 7
What are the symptoms of a zinc deficiency?

The symptoms of zinc deficiency are often non-specific or are associated with other disorders. On the one hand, there are a number of mental symptoms such as tiredness, lack of drive, decreasing physical effectiveness, reduced concentration, mood instability, chronic states of exhaustion and depressions.

A zinc deficiency can lead to hormonal changes, expressed by insufficient sexual interest, potency disorders, reduced readiness for conception or barrenness. Furthermore, zinc deficiency leads to changes in the skin, hair and nails. The sense organs are also affected. Eye dryness, vision disorders, sudden nyctalopia, olfactory sense problems or ageusia appear. Additional symptoms of zinc deficiency are a restricted immune system, thymus gland involution, lack of appetite, anemia, growth disorders in children and adolescents as well as increased blood sugar levels (Fig. 8).
Symptoms of a zinc deficiency

- **Hair**
  - Thinner hair
  - Hair loss

- **Brain**
  - Low drive
  - Concentration disorders
  - Learning disability
  - Depressions

- **Sense organs**
  - Impairment of sense perception, such as nyctalopia, taste and smell disorders

- **Lungs**
  - Increased susceptibility for infections
  - Thymus gland involution

- **Organism**
  - Weight loss

- **Sexual organs**
  - Faulty sexual development
  - Pregnancy complications

- **Bone**
  - Growth delays

- **Skin**
  - Inflammatory skin reactions
  - Skin changes
  - Delayed wound healing

- **Nails**
  - Brittle, white patchy nails

*Fig. 8*
Zinc – for the normal functioning of the immune system

Immune cells show a high proliferation rate and differentiation. They are therefore dependent on a constant supply of sufficient quantities of zinc. A zinc deficit not only influences an individual component in the immune system, but also affects several levels as well as the expression of hundreds of genes.\textsuperscript{(12)} Short-term effects include the regulation of biological activity of thymulin, a thymus peptide. Changes in the immune cell subpopulation are one of the long-term effects.

**Zinc as a signal molecule**

An important mechanism by which zinc influences the immune system is its role as a signal molecule. The zinc homoeostasis is controlled by three mechanisms:

1. Transportation by the plasma membrane by zinc transporter,
2. Intermediate storage by metallothionein and
3. Storage and release from vesicles, so-called zincosomes\textsuperscript{(12)}

**Zinc deficiency shifts the immune equilibrium in the TH2 direction**

A zinc deficiency influences both congenital as well as acquired immunity (Fig. 9). In the case of congenital immunity, this concerns an impaired phagocytosis, the killing of parasites, the so-called “oxidative burst” of the monocyte and neutrophilic granulocytes as well as a reduction of natural killer cell activity.\textsuperscript{(12)} The B- and T-cells are part of the acquired immunity. A zinc deficiency impairs B-cell lymphopoiesis, reduces antibody production and causes a deterioration of T-cell functionality.\textsuperscript{(12)} The TH1/TH2 moreover shift the balance in the TH2 direction.
Zinc and the immune system

B-cells lymphopoiesis

T-cells function

TH1/TH2 balance

Production of antibodies

Acquired immunity

Congenital immunity

- Natural killer cell activity
- Oxidative burst
- Killing the bacteria of parasites
- Phagocytosis


Fig. 9
Vitamin D3

Vitamin D3 plays a special role among the vitamins. It is only supplied to 10–20% with food. The body forms 80–90% of its vitamin D3 with the help of sunlight itself (Fig. 10). Vitamin D3 is only available in foods to a limited degree. The concentration is the highest in fatty fish varieties, such as salmon or herring. Cod liver oil also contains vitamin D3. It is therefore not possible to cover the intake of vitamin D3 with food alone. Since the body itself, with help of UV radiation, forms the sun vitamin D3, one should think that, at least in the summer, a vitamin D3 deficiency should not present a problem in Germany.

Almost a third of Germans have a serious vitamin D3 deficiency

In 2015, in an additional large-scale trial (n = 6,995), the vitamin D3 status of Germans was once again examined.[13] 61.6% of the participants showed a value < 20 ng/mL 25-hydroxy vitamin D3 and thereby had a vitamin D3 deficiency. For 30.2% of Germans, the 25-hydroxy vitamin D3 concentration was even below 12 ng/mL (Fig. 11). This corresponds to a serious vitamin D3 deficit. Only 11.8% of the participants showed an optimal vitamin D3 status.
Synthesis and tasks of vitamin D₃

Figure 10

- Supports bone mineralization
- Contributes to teeth preservation
- Supports muscle function
- Regulates cell division
- Regulates calcium level in blood
- Regulates phosphate metabolism
- Regulates the immune system

Absorption in intestine
Reabsorption in kidney
A vitamin D3 deficiency increases the risk of developing cancer and possibly death by cancer.\textsuperscript{[14]} For less than 20 ng/mL 25-hydroxy vitamin D3, the risk of becoming colorectal, breast or prostate cancer as well as other cancer types increases by 30–50\%.\textsuperscript{[13]} Apart from cancer, numerous autoimmune disorders are associated with vitamin D3 deficiency, including diabetes, multiple sclerosis, rheumatic arthritis and Morbus Crohn.\textsuperscript{[14]} Also, the development and severity of infections can be negatively influenced, for instance in tuberculosis, influenza and infections of the upper respiratory tract. People with a vitamin D3 deficit are more vulnerable to depressions and schizophrenia.\textsuperscript{[14]} Furthermore, there is an increased risk of high blood pressure and cardiovascular disorders (Fig. 12).
Effects of a vitamin D3 deficit

- Schizophrenia
- Depression
- Cardiovascular disorders
- High blood pressure
- Asthma
  - forced expiration volume in one second
- Loss of muscular strength
- Muscle pain (myalgia)
- Osteoporosis
- Osteoarthritis
- Osteomalacia
- Rickets
- Infections:
  - Tuberculosis
  - Influenza
  - Infections of the upper respiratory tract
- Autoimmune disorders:
  - Type 1 diabetes
  - Multiple sclerosis
  - Morbus Crohn
  - Rheumatic arthritis
- Type 2 diabetes
- Metabolic syndrome
- Cancer:
  - breast, colon, prostate, pancreas etc.


Fig. 12
Vitamin D₃ deficiency or skin cancer?

An increase of vitamin D₃ formation by extended sunbaths can only be recommended to a restricted degree, because sunburn should be avoided due to the danger of skin cancer. The use of suntan lotions to protect from the harmful effects of solar radiation is of little use, since suntan lotions also block UV radiation. A sun protection factor of 15 absorbs 99% of the UVB radiation and therefore also reduces the vitamin D₃ synthesis of skin by 99%. A randomized clinical trial supported this data. A supplementation with vitamin D₃ is therefore appropriate.

Overdose with vitamin D₃ unlikely

An overdose of vitamin D₃ need not be feared since the active form is manufactured in the kidney as required, and the body eliminates the rest of the inactive form. Older people are also at risk of a vitamin D₃ deficiency since vitamin D₃ formation decreases over the years.

What is an optimal vitamin D₃ status?

The concentration of 25-hydroxy vitamin D₃ in the blood is measured in order to determine the vitamin D₃ status. A 25-hydroxy vitamin D₃ concentration below 20 ng/mL determines a vitamin D₃ deficiency which significantly increases the risk of diverse disorders (Fig. 13). A value between 20 and under 30 ng/mL can be called a restricted vitamin D₃ supply. An optimal vitamin D₃ level is meanwhile regarded to be in the range between 40 to 80 ng/mL. Especially people over 60 years old should have a 25-hydroxy vitamin D₃ concentration in the blood above 30 ng/mL.
Vitamin D₃ barometer

100 ng/mL
250 nmol/l

40-80 ng/mL
or 100-200 nmol/l
Optimal vitamin D₃ supply

30 ng/mL
75 nmol/l

< 30 ng/mL or 75 nmol/l
No optimal supply of the body possible
→ Increased risk for disorders

20 ng/mL
50 nmol/l

< 20 ng/mL or 50 nmol/l
Vitamin D₃ deficiency
→ Significant increased risk for disorders

Fig. 13
Folic acid

Folic acid belongs to the group of B vitamins and is involved in growth processes, cell division and blood formation in the body. It is especially important in pregnancy to avoid neural tube defects. Vitamin B12 is closely associated with folate metabolism (Fig. 14).

Folic acid – a risk vitamin primarily for women

The daily folic acid requirements for women is 300 μg (German Association of Nutrition [DGE]). An investigation of 1,341 women in the framework of the baby care program of the statutory health insurance providers in Germany showed that 74 % of women have a daily folic acid intake below 70 % of the desired value (< 210 μg/day). 34 % of women do not even achieve 50 % of the recommended daily amount (< 150 μg/day).
Close interaction between folic acid and vitamin B₁₂

Fig. 14
Folic acid protects against cognitive impairments

Based on data collected by the “National Health and Nutrition Examination Survey” (NHANES), it could be shown that vitamin B₁₂ levels, independent of the folic acid status, are associated with anemia and cognitive impairments (Table 1).[16]

If a high folic acid status is added to a low vitamin B₁₂ status, these negative effects are even reinforced. In exchange, the risk of cognitive impairment with a normal vitamin B₁₂ status and high folate values declined significantly by 60% (= R 0.4; 95% CI 0.2–0.9). With folic acid supplementation, it is therefore appropriate to supplement with vitamin B₁₂. The same applies in the converse case.

Folic acid for stroke prevention

The most current meta-analysis on stroke prevention with folic acid concluded that a supplementation with folic acid reduced the risk of a stroke by 8% (n = 55.764; RR 0.92; 95% CI 0.86–1.00; p = 0.038).[17]

An additional large-scale trial (n = 20.702) investigated the effect of a folic acid supplementation for adults with high blood pressure.[18] All participants in the study received the ACE inhibitor enalapril plus 800 µg folic acid or a placebo. The additional folic acid supplementation significantly reduced the risk of stroke by 21% (HR 0.79; 95% CI 0.68–0.93; p = 0.003). The risk of cardiovascular events (cardiovascular fatal injuries, cardiac infarction and strokes) was significantly reduced by 20% (HR 0.80; 95% CI 0.69–0.91; p = 0.002).
### Folic acid protects against cognitive impairments

<table>
<thead>
<tr>
<th>Vitamin B12 status</th>
<th>Folic acid status</th>
<th>N</th>
<th>Number affected</th>
<th>OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Anemia</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normal</td>
<td>Normal</td>
<td>913</td>
<td>3.5%</td>
<td>1.0</td>
</tr>
<tr>
<td>Normal</td>
<td>High</td>
<td>198</td>
<td>2.5%</td>
<td>0.6 (0.2–2.5)</td>
</tr>
<tr>
<td>Low</td>
<td>Normal</td>
<td>297</td>
<td>6.9%</td>
<td>2.1 (1.1–3.8)</td>
</tr>
<tr>
<td>Low</td>
<td>High</td>
<td>49</td>
<td>15.0%</td>
<td>5.2 (2.5–11.0)</td>
</tr>
<tr>
<td><strong>Cognitive impairment</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normal</td>
<td>Normal</td>
<td>826</td>
<td>18.0%</td>
<td>1.0</td>
</tr>
<tr>
<td>Normal</td>
<td>High</td>
<td>180</td>
<td>11.0%</td>
<td>0.4 (0.2–0.9)</td>
</tr>
<tr>
<td>Low</td>
<td>Normal</td>
<td>253</td>
<td>25.0%</td>
<td>1.7 (1.01–2.9)</td>
</tr>
<tr>
<td>Low</td>
<td>High</td>
<td>42</td>
<td>45.0%</td>
<td>5.1 (2.7–9.5)</td>
</tr>
</tbody>
</table>

Significant = bolded numbers


*Table 1*
Coenzyme Q10

The coenzyme Q10, also called ubiquinone, is a liposoluble substance that resembles the fat-soluble vitamins E and K. Coenzyme Q10 can be manufactured by the body itself if sufficient folic acid, niacin, vitamin B5, B6 and B12 as well as the amino acids phenylalanine, tyrosin and methionine are available. Every day the human body converts relatively large quantities of coenzyme Q10. The total stock in the human body depends on the supply and lies in the range of 0.5–1.5 grams. Due to its high molecular weight and lipid solubility, the bioavailability of added coenzyme Q10 is low and is only between 5–10%. The absorption rate moreover declines with increasing dosage. The simultaneous intake of fats and secondary plant substances, such as flavonoids, increases the bioavailability of coenzyme Q10.

When is there an increased need?

Increased requirements are caused by stress, sport, high alcohol consumption, infections, myocardial insufficiency, muscular atrophy, hyperthyroidism, diabetes, Alzheimers and Parkinson diseases. Drugs such as statins, Parkinson agents, cancer agents, antidepressants and betablockers also increase the requirements.
Which functions does coenzyme Q10 have?

Coenzyme Q10 is an important component in the respiratory chain of mitochondria, the power plants in every cell. Coenzyme Q10 can moreover regenerate the vitamin E radicals arising from the degradation of ROS into vitamin E. This function however reduces the quantity of coenzyme Q10, which is available for energy extraction in the mitochondria. Apart from the mitochondria, high coenzyme Q10 concentrations are also located in the cell membranes. Very diverse substances are transported by the cell membranes. Coenzyme Q10 is involved in these transports. Many medicinal products are only able to reach their site of action in this way.
How can a coenzyme Q10 deficiency develop?

With balanced nutrition, a coenzyme Q10 deficiency occurs rather rarely. However with increasing age, the coenzyme Q10 concentration in the organs declines (Fig. 14). The reduced coenzyme Q10 quantity in the body with increasing age is primarily noticeable in the myocardium, but also in the liver and skeletal muscle. While a 40-year old has about 30 % less coenzyme Q10 in the myocardium, the coenzyme Q10 concentration of an 80-year-old is 50–60 % below that of a healthy 20-year old. Functional disorders can be expected with a coenzyme Q10 deficiency of 25 %.

If the coenzyme Q10 concentration declines below 75 %, it can lead to life-threatening malfunctions. Several factors come into consideration as a cause for the reduction of coenzyme Q10 content at an advanced age. Apart from reduced endogenous synthesis and inadequate intake with food, the reduction of mitochondria mass and increased consumption by oxidative stress are causes.

Coenzyme Q10 and the immune system

If the body does not have sufficient coenzyme Q10, the function of the immune system is impaired. Animal experiments could demonstrate that the coenzyme Q10 stimulates the phagocytosis by macrophages and the increase of granulocytes.[19] A nutritional supplement with 200 MG coenzyme Q10 per day improved the relationship between T4-helper and T8 suppressor cells.[20]
The coenzyme Q10 concentration declines with age.

Fig. 14

modified after A. Kalen et al. (1989) Lipids, 24, 579
Secondary plant substances from tomatoes and Tagetes erecta

Secondary plant substances, which among others include the carotinoids, actually have the task of defending against pests and attracting insects. Carotinoids are liposoluble pigments that give fruits and vegetables their yellow and red color. In the human organism, secondary plant substances have developed numerous health-promoting effects.

Carotinoids

The most frequently occurring carotinoid is β-carotene, a preliminary stage of vitamin A. β-carotene is therefore also designated as provitamin A. Six carotinoids play an essential role in the human body: β-carotene, α-carotene, lycopene, β-Cryptoxanthin, lutein and zeaxanthin. Apart from β-carotene, α-carotene and β-cryptoxanthin are also provitamin A-carotinoids.

β-carotene, α-carotene and lycopene belong to the oxygen-free carotinoids and occur primarily in red, yellow and orange fruit and vegetables and are heat-stabilized. Oxygen xanthophyll are lutein, zeaxanthin and β-Cryptoxanthin. Xanthophyll is predominately found in leafy green vegetables.

Biological activity of carotinoids

The biological activity of carotinoids is based on several functions, the primary one being their function as pro-vitamin A and as antioxidants. Carotinoids moreover improve the communication between cells by stimulating the synthesis of connexins (Fig. 15).[26]

Connexin proteins form gap junctions in cell membranes. These gap junctions and the help of little molecules makes it possible for a cell to communicate with other cells. This type of communication is important for differentiated cells and often becomes lost in cancer cells. Carotinoids increase the expression of the connexin coding proteins. This function is independent of those of provitamin A or antioxidant.[27]
Biological activity of carotenoids

![Graph showing the number of communicating cells over days for different treatments: + β-carotene, + canthaxanthin, and Control. The graph includes data points at days 3, 5, 10, and 15.](image)

Stahl et al. 1997

*Fig. 15*
Carotinoids protect from cardiovascular disorders

Those who consume a lot of fruit and vegetables reduce their total mortality and are protected against cardiovascular disorders.[32] Until now there is no clarity on the basic mechanisms of these positive effects. Fruits and vegetables contain a large quantity of carotinoids. A clinical trial demonstrated, for example, that high carotinoid serum levels are associated with a reduced risk of increased NT-proBNP values, a marker for cardiac insufficiency.[33]

In an additional trial, high plasma values of lutein and cryptoxanthin were associated with a reduced risk of cardiac infarction (p = 0.03).[34]

Positive effects of carotinoids for atherosclerosis patients

Carotinoids also appear to have a positive effect on atherosclerosis. A low plasma lycopene level was associated with subclinical atherosclerosis.[35] A seven-year follow-up trial could moreover show that high plasma carotinoid values protect from early-onset atherosclerosis.[36] The maximum intima media thickness was inversely associated with lycopene (p = 0.005), α-carotene (p = 0.002) and β-carotene (p = 0.019) (Fig. 16).

Carotinoids protect from dysglycaemia

A large-scale prospective trial (n = 1,389) could confirm that the plasma-carotinoid level is independently associated with the onset of dysglycaemia.[37] The risk of dysglycaemia in the highest quartile at 74% was significantly lower compared to the lowest quartile (RR 0.26; 95% CI 0.14–0.49; p < 0.0001). According to a multi-variant analysis with a multitude of variables (among others, cardiovascular disorders, blood pressure, BMI, lipid profile, living habits), the significant association remained (HR 0.42; 95% 0.22–0.82; p = 0.01).
High plasma carotinoid values protect from early atherosclerosis


Fig. 16
<table>
<thead>
<tr>
<th>Nutrient</th>
<th>per capsule</th>
<th>NRV*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coenzym Q10</td>
<td>20 mg</td>
<td></td>
</tr>
<tr>
<td>Lycopene</td>
<td>1.3 mg</td>
<td></td>
</tr>
<tr>
<td>Lutein</td>
<td>1.3 mg</td>
<td></td>
</tr>
<tr>
<td>Vitamin A</td>
<td>317 µg RE / 1,056 IU</td>
<td>40%</td>
</tr>
<tr>
<td>of these: β-carotene</td>
<td>167 µg RE / 556 IU</td>
<td></td>
</tr>
<tr>
<td>Vitamin C</td>
<td>100 mg</td>
<td>125%</td>
</tr>
<tr>
<td>Vitamin E</td>
<td>12 mg</td>
<td>100%</td>
</tr>
<tr>
<td>Vitamin D₃</td>
<td>20 µg</td>
<td>400%</td>
</tr>
<tr>
<td>Vitamin B₁</td>
<td>1 mg</td>
<td>91%</td>
</tr>
<tr>
<td>Vitamin B₂</td>
<td>1.2 mg</td>
<td>86%</td>
</tr>
<tr>
<td>Vitamin B₆</td>
<td>1.2 mg</td>
<td>86%</td>
</tr>
<tr>
<td>Pantothenic acid</td>
<td>6 mg</td>
<td>100%</td>
</tr>
<tr>
<td>Vitamin B₁₂</td>
<td>2 µg</td>
<td>80%</td>
</tr>
<tr>
<td>Biotin</td>
<td>70 µg</td>
<td>140%</td>
</tr>
<tr>
<td>Folic acid</td>
<td>200 µg</td>
<td>100%</td>
</tr>
<tr>
<td>Niacin</td>
<td>16 mg NE</td>
<td>100%</td>
</tr>
<tr>
<td>Chromium</td>
<td>30 µg</td>
<td>75%</td>
</tr>
<tr>
<td>Copper</td>
<td>1 mg</td>
<td>100%</td>
</tr>
<tr>
<td>Molybdenum</td>
<td>50 µg</td>
<td>100%</td>
</tr>
<tr>
<td>Selenium</td>
<td>70 µg</td>
<td>127%</td>
</tr>
<tr>
<td>Zinc</td>
<td>10 mg</td>
<td>100%</td>
</tr>
</tbody>
</table>

* Reference quantities for the daily intake of vitamins and minerals Nutrient reference values (NRV = Nutrient Reference Values)

IU = International Units, NE = Niacin Equivalent, RE = Retinol Equivalent
References


CAREIMMUN Basic®

CAREIMMUN Basic® was developed to meet the usual basic requirements for vitamins.

A diversified and well-balanced diet and a healthy lifestyle is important.

CAREIMMUN Basic® at a glance

- The essential vital substances in a capsule
- With coenzyme Q10 and secondary plant substances
- Increased vitamin D₃ content according to recommendation of the DGE (German Nutrition Association)
- Folic acid in the form of methyltetrahydrofolate
- Flexible administration options
- Without milk sugar, gluten, gelatin, yeast or preservatives

Recommended intake

Consume one capsule per day with fluid.

General notices

Food supplements should not be used as a replacement for a well-balanced and diversified diet. The specified recommended daily intake may not be exceeded.

Store outside the effective reach of small children.
Food supplement

CAREIMMUN Basic®, 90 capsules.
We also offer CAREIMMUN Basic® in packages with 30 and 270 capsules.

List of ingredients: Filling material: microcrystalline cellulose; L-ascorbic acid (Vitamin C), Coating agent: hydroxypropyl methylcellulose; magnesium oxide, coenzyme Q10, nicotinamide (Vitamin B3), D-α-tocopheryl acetate (Vitamin E), lycopene, zinc oxide, copper gluconate, Coating agent: shellac; calcium-D-pantothenate (Vitamin B5), lutein, maize starch, β-carotene, sucrose, Thickening agent: gum arabic; retinyl acetate (Vitamin A), pyridoxine hydrochloride (Vitamin B6), thiamine mononitrate (Vitamin B1), riboflavin (Vitamin B2), herbal oils (coconut, palm), Anti-caking agent: magnesium salts of fatty acids; calcium-L-methylfolate, maltodextrin, sodium selenate, chromium(III) chloride, sodium molybdate, D-biotin, cholecalciferol (Vitamin D3), Anti-caking agent: tricalcium phosphate; acidifier: trisodium citrate; cyanocobalamin (Vitamin B12), Acidifier: citric acid, Thickening agent: sodium alginate.

Declared contents: 10-pack: 6.3 g / 90-pack: 56.7 g / 270-pack: 170.1 g
07/2017

Contact and information

Additional information is available at:
www.biosynpharma.com

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information@biosyn.de

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biosyn Arzneimittel GmbH

World market leader in high-dose selenium injections

biosyn Arzneimittel GmbH is a pharmaceutical and biotechnology company with headquarters in Fellbach near Stuttgart, Germany. It specializes in trace elements, a world market leader in high-dose selenium injections, and developer and operator of two worldwide unique GMP active substance manufacturing plants. The company is furthermore active in the biotechnology field with a glycoprotein isolated from Megathura crenulata, a sea snail whose natural habitat is off of California. 70 percent of sales is achieved outside of Germany, in 25 countries around the world.

Active in the fields of intensive care, oncology and endocrinology, biosyn with its products is a partner for hospitals and private practice physicians as well as naturpaths and natural health practitioners. The company pursues research and development and evaluates current medical scientific literature and modern online marketing. The mid-sized family-owned company places great value on an open, engaged and customer-oriented corporate culture.

GMP production of Sodium selenite at biosyn: Vacuum-drying facility for the selective crystallization of metal salts with defined hydrate percentages
Food supplement with vitamins, trace elements, coenzyme Q10 and secondary plant substances (lycopen and lutein)