

FAQ

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Coenzyme Q10: what is known about the health risks – and what isn't?

Coenzyme Q10 is essential for the metabolism, but can be produced by the body itself. It is an important component of the mitochondria, which are responsible for the energy metabolism in the body's cells. Coenzyme Q10 is involved in the electron transport in the mitochondria and, as an antioxidant, can protect cells from oxidative damage caused by so-called "free radicals". Tissues with a high energy requirement, such as the heart, kidneys, liver and muscles, have particularly high levels of coenzyme Q10. Coenzyme Q10 is not an essential nutrient (to be supplied by food), as this substance is produced in sufficient quantities by a healthy body itself. In healthy individuals following a varied, balanced diet, a sufficient supply of coenzyme Q10 is guaranteed.

Regarding the health assessment of the two forms of the coenzyme – ubiquinol and ubiquinone – there are currently gaps in knowledge and scientific uncertainties due to insufficient data.

What is coenzyme Q10?

Coenzyme Q10 (or ubiquinone-10) belongs to the group of ubiquinones that are found in all living cells, and is involved in mitochondrial energy production processes in the respiratory chain. Coenzyme Q10 is chemically similar to vitamin K and vitamin E. However, coenzyme Q10 is not an essential nutrient (to be supplied with food) or a vitamin, since this substance is produced in sufficient quantities by a healthy organism. The substance can be produced in the human body from phenylalanine or tyrosine and mevalonic acid, which ensures a sufficient supply if the body functions normally and the person eats a varied and balanced diet.

What is coenzyme Q10 needed for in the body?

Coenzyme Q10 is essential for the metabolism. It is involved in energy metabolism in the mitochondria of the body's cells. As an antioxidant, it can also protect cell membranes in particular from oxidative damage caused by so-called "free radicals". These are highly

reactive substances that can damage cells and tissue, among other things. Tissues with a high energy requirement such as the heart, kidneys, liver and muscles have particularly high levels of coenzyme Q10.

Which foods are naturally good sources of coenzyme Q10?

The estimated intake of coenzyme Q10 through a normal diet is on average 3-6 mg per day. The consumption of meat is the main source of intake, but fish, nuts and some oils are also some of the richest sources of coenzyme Q10, while fruit, vegetables, cereals and dairy products only contain low levels of coenzyme Q10 of between 0.01 and 0.3 mg per 100 g.

To which foods is coenzyme Q10 added?

Coenzyme Q10 is added to food supplements in the form of both ubiquinone and ubiquinol and is marketed in varying doses in single and combination preparations.

How is the German population supplied with coenzyme Q10?

Coenzyme Q10 is produced in sufficient quantities by the healthy human body on a daily basis, which means that a sufficient supply is guaranteed if the body functions normally and the person eats a varied and balanced diet.

What is known about the health risks of a coenzyme Q10 deficiency?

A coenzyme Q10 deficiency that requires treatment or results in physical deficiency symptoms is not yet known. From a nutritional-medical point of view, a targeted additional intake of coenzyme Q10 via food supplements is therefore not considered necessary.

What is known about the health risks of a coenzyme Q10 overdose?

There are currently gaps in knowledge and scientific uncertainties regarding the health assessment of both Q10 forms ubiquinol and ubiquinone, due to insufficient data. The following statements can currently be made:

In some studies, occasional adverse effects were observed with an additional intake of coenzyme Q10 at doses of up to 300 mg per day, mainly in the digestive system, such as nausea, heartburn, gastric distress, upper abdominal discomfort or diarrhoea. Isolated skin rashes were also reported in studies. Whether these described effects occur more frequently with daily intakes of more than 300 mg per day or whether other effects might occur additionally, has not been investigated, yet.

Overall, relatively few data are available on the supplementation of coenzyme Q10 in healthy people. In particular, there are insufficient studies on the health effects of additional intake of Q10 via coenzyme Q10 supplements in pregnant and breastfeeding women as well as children and adolescents. Therefore, the BfR recommends that these groups should not

use products with relevant daily doses or that a physician/medical professional should be consulted before use.

The question of whether there might be interactions between coenzyme Q10 and medicines to lower blood pressure or inhibit coagulation (coumarin-type anticoagulants) has also not been sufficiently investigated yet. Therefore, the BfR recommends that people taking such medicines seek medical advice before taking coenzyme Q10 preparations with daily doses of more than 100 mg.

Who should pay particular attention to an adequate supply of coenzyme Q10?

According to the current state of knowledge, there is no reason to formulate general supply recommendations for coenzyme Q10 for specific population groups, as the substance is produced by the body itself and there is currently no scientific evidence of physical deficiency symptoms and associated health risks.

The BfR would also like to point out that the European Food Safety Authority (EFSA) has evaluated health claims relating to coenzyme Q10 (in relation to the healthy general population) - and considered them to be scientifically unproven. This means that advertising claims in connection with coenzyme Q10, such as “increases performance and improves health” and “strengthens the body’s defences” are not permitted in the EU. The corresponding EFSA opinion was published in 2010 and can be accessed using the following link: <http://www.efsa.europa.eu/de/efsajournal/pub/1793.htm>

Is a dietary supplement with coenzyme Q10 generally useful /recommended?

Healthy people can produce sufficient amounts of coenzyme Q10 themselves from the amino acids phenylalanine and tyrosine as well as from mevalonic acid. Both of these amino acids are components of dietary protein and are found in particular in vegetables, nuts, dairy products, meat and fish. We mainly absorb mevalonic acid from plant-based foods. Therefore, a person with a normally functioning body who eats a varied and balanced diet is guaranteed a sufficient supply of coenzyme Q10. There is currently no evidence of a coenzyme Q10 deficit in the population. Taking additional coenzyme Q10 via food supplements is therefore not necessary.

Are there legal maximum levels for coenzyme Q10?

There are no legal regulations or maximum amounts for the addition of coenzyme Q10 to foods in the EU. In 2014, the Federal Office of Consumer Protection and Food Safety (BVL) issued a general ruling in accordance with paragraph 54 German Food and Feed Code (LFGB) for the addition of up to 100 mg of coenzyme Q10 (as a daily amount) to food supplements. This was associated with the requirement to include a warning on the labelling stating that pregnant women, nursing mothers as well as children and adolescents under the age of 18 should not consume the product. Since it is currently not possible to conclusively assess the

extent to which clinically relevant interactions of coenzyme Q10 with coumarin-type anticoagulants or with medicines to lower blood pressure may occur, the BfR recommends that people taking these kinds of medicines seek medical advice before taking food supplements with daily doses of more than 100 mg coenzyme Q10.

Although food supplements are offered in the form of tablets, lozenges or as powders, they are not medicines, but foods intended to supplement a normal diet. As foods, they must be harmless to health and must not have any adverse effects. They must not be intended to cure or prevent diseases. Unlike medicinal products, which undergo an approval procedure, food supplements are only subject to compulsory registration with the BVL. The manufacturers and distributors are responsible for the safety of the products. In Germany, the monitoring authorities of the federal states' ("Länder") are responsible for monitoring food supplements offered on the market and the manufacturing companies.

Where can I find more information?

A lot of additional information on this topic can be found on the BfR website, for example here:

- [FAQ on food supplements](#)

About the BfR

The German Federal Institute for Risk Assessment (BfR) is a scientifically independent institution within the portfolio of the Federal Ministry of Food and Agriculture (BMEL) in Germany. The BfR advises the Federal Government and the federal states ('Länder') on questions of food, chemicals and product safety. The BfR conducts independent research on topics that are closely linked to its assessment tasks.

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Publisher:

German Federal Institute for Risk Assessment

Max-Dohrn-Straße 8-10

10589 Berlin, Germany

T +49 30 18412-0

F +49 30 18412-99099

bfr@bfr.bund.de

bfr.bund.de/en

Institution under public law

Represented by the president Professor Dr Dr Andreas Hensel

Supervisory Authority: Federal Ministry of Food and Agriculture

VAT ID no. DE 165 893 448

Responsible according to the German Press Law: Dr Suzan Fiack



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