

Coenzyme Q10 - an important endogenous source of energy

- Importance in the treatment of cardiovascular diseases -

By Professor Joachim Schmidt

Coenzyme Q10, also known as ubiquinone or Q10 or ubi for short, is an important endogenous substance which is of great importance for the provision of energy in the "powerhouses of the cell", the mitochondria, and their protection against oxidative damage. Chemically, it has a quinone structure. The prefix "ubi" means that this substance is ubiquitous, i.e. it occurs everywhere in the body. Particularly high concentrations are found in locations with a high energy demand, e.g. the heart.

Coenzyme Q10 can be formed in the body itself and is also taken in in the diet. It belongs to the group of vitamin-like substances, the vitaminoids. Foods which are particularly rich in coenzyme Q10 are meat, poultry and fish (sardines and mackerels), as well as cold-pressed vegetable oils such as olive oil, rapeseed oil and wheat germ oil. Fruit, vegetables, eggs and dairy products have an average coenzyme Q10 content. Approximately 25% of the coenzyme Q10 requirement has to be taken in with the diet even if endogenous Q10 synthesis is optimal.

With increasing age, the body's ability to produce coenzyme Q10 diminishes, resulting in a reduction in the Q10 contents of the organs. For example, the coenzyme Q10 contents of the heart fall by approximately 30% in 40-year-olds and by 60% to 80% in 80-year-olds, compared to a 20-year-old. This results in significant restrictions in terms of the provision of energy (ATP formation) and protection against oxidative damage. Furthermore, significant reductions in the formation of coenzyme Q10 have been reported in certain diseases (e.g. ischaemic coronary disease, heart failure, neuromyopathies, Parkinson's disease etc.) or under the influence of certain medications (e.g. statins). These losses can then no longer be compensated for in the diet and the daily substitution of coenzyme 10 by means of the preparations that are available is required.

There are particularly extensive findings available on the significance of coenzyme Q10 in cardiovascular disease. Here, the marked decrease in coenzyme Q10 concentrations associated with these diseases has resulted in particularly intense investigations into the efficacy of Q10 substitution. It can be considered to have been confirmed today that in cases of heart failure, ischaemic heart disease, dilated cardiomyopathy and hypertension, treatment with coenzyme Q10 provides extensive support to the treatment.

In patients with cardiac insufficiency, several controlled clinical trials have demonstrated that through the treatment with coenzyme Q10 in addition to standard therapy, a significant improvement in cardiac function associated with a

corresponding improvement in resilience and the feeling of well-being. In a meta analysis performed by *Sander et al.* (2006), in which the results of 11 randomised clinical trials relating to this question were analysed, it was possible to confirm the positive effect of coenzyme Q10 impressively. A reduction in symptoms was also shown in patients with ischaemic heart disease. In a double-blind study performed on 144 patients who had experienced a myocardial infarction, it was possible to show that the intake of 120 mg of Q10 over a period of 6 weeks not only significantly reduced the number of cases of reinfarction, but also induced a significant reduction in cardiac dysfunction, arrhythmias and angina pectoris attacks. Further clinical studies confirm the reduction in the number of angina pectoris cases, improved physical resilience and a fall in the ischaemic symptoms recorded electrocardiographically.

It is also considered to have been conclusively demonstrated that coenzyme Q10 has a supportive effect in the treatment of patients with hypertension. A meta analysis on the effect of Q10 in patients with hypertension showed a reduction in systolic blood pressure by 17 mmHg on average and diastolic blood pressure by up to 10 mmHg. With this meta-analysis, 12 clinical trials involving 362 patients who were treated over a period of 8-12 weeks with 100-120 mg of coenzyme Q10 daily were evaluated. It is also interesting to note that in several of these studies, a positive effect on the fat and glucose metabolism was also found.

Coenzyme Q10 should also be taken in with the food, because this is the method by which it is best absorbed by the body. Even at dosages of 30 mg of coenzyme Q10 per day it is possible to achieve a significant improvement in the Q10 status. In order to achieve therapeutic effects, 60 to 150 mg per day is recommended. Far higher dosages have also been investigated and tolerated in individual studies, which proves the good tolerability of coenzyme Q10. The substance should be consumed over a prolonged period, as Q10 deficiency is only compensated for gradually. In associated studies it has been possible to show that over a period of one to three months, it is possible to achieve a continuous increase in Q10 levels in the tissue. The endogenous production of coenzyme Q10 is not affected by the intake of Q10 products.

Clinical trials confirmed the efficacy of coenzyme Q10 substitution in a number of other disorders which are associated with Q10 deficiency. However, the initial aim of this article is to focus on the significance of Q10 in cardiovascular diseases.

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