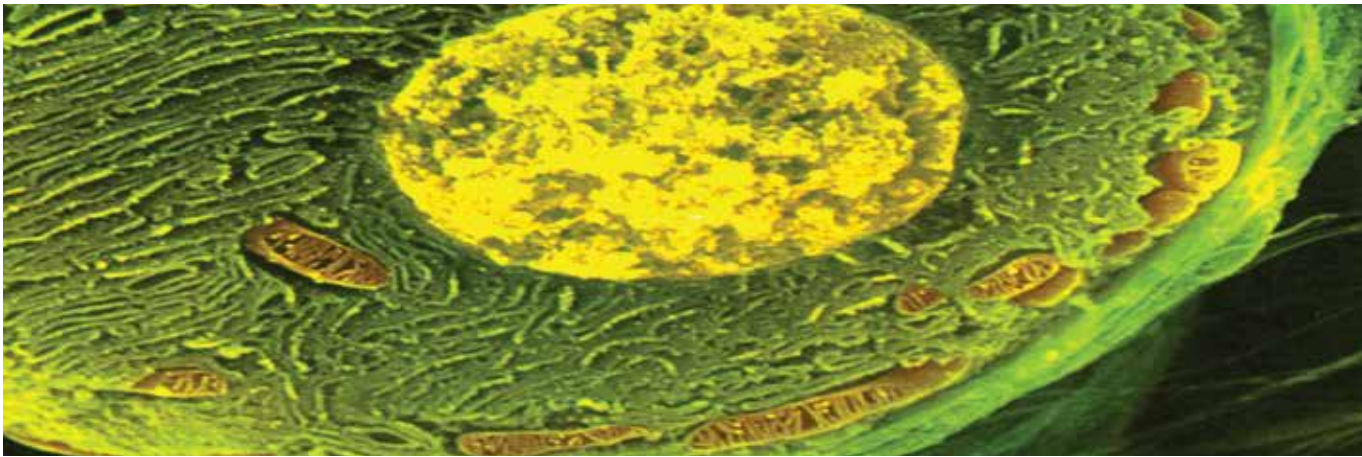


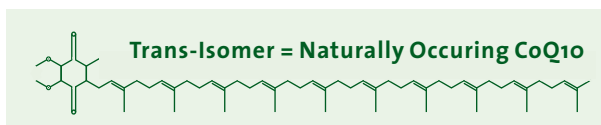
# Coenzyme Q10



A View of Bioenergetics in the Cell and Membrane Protection

- **Lipid-Corrected Q10 Determination**
- **Calculation of the Individual Risk Score**
- **External Quality Assurance in Accordance with Guidelines of the International Q10 Society**

Coenzyme Q10 was detected in 1955 (Crane et al.) and its structure described the first time in 1957 (Folkers et al.).



Mitchel et al. received the Nobel Price for the description of the Q10 cell metabolism in 1978.

Coenzyme Q10 ubiquitously occurs in all cells and can also be synthesized by all cells. Preconditions for the latter are tyrosine, methionine and mevalonic acid. Important co-factors are folic acid and vitamin B12.

1-3 g of co-enzyme Q10 are consumed with food (mainly meat) every day.

**Basic Effects:**

1. Key enzyme of mitochondrial energy production (ATP)
2. Antioxidant with special status

Table: Age-related decrease Q10-production compared, to values of 20-year old people

Age	Approx. 40 years	Approx. 80 years
Heart	- 32 %	- 57 %
Pancreas	- 8 %	- 69 %
Liver	- 5 %	- 17 %

**ATP-Energy Production in the Cell**

The cellular energy production mainly depends on the cell's power plants – the mitochondria. Here co-enzyme Q10 is a limiting factor. A deficit of more than 25 % leads to structural mitochondria damage, which is associated with the development of chronic energy deficiency. Cell and organ damages might be the consequence.

Coenzyme Q10 is an important component of membranous energy development (transport channels, ion pumps etc.)

**Modulation / Maintenance of Anti-Oxidative/ Pro-Oxidative Balance**

Q10 has a special position as antioxidant. It protects lipids, proteins and genetic information (DNA) from being damaged by free radicals. Different from other antioxidants it is able to activate its protection against free radicals in all phases.

Coenzyme Q10 is the only liposoluble antioxidant, which is synthesized in the body itself.

Different quantities of coenzyme Q10 are contained in all cell membranes (depending on the function). It regenerates important antioxidants like vitamin E and C.

Within the cell membranes Q10 is responsible for the protection against free radicals and is a controlling component of functionality (e.g. nervous conduction capability or substance transfer through cell walls). It has significant influence on membrane quality. Q10 protects cholesterol components in blood from peroxidation by free radicals.

**Performance in the Body:**

Coenzyme Q10 is mainly absorbed in the small intestine. The transport in blood is carried out by LDL cholesterol. The tissue levels are usually 6 – 10 times higher than those of vitamin E. In the body Q10 is present in reduced form (ubiquinol) and in oxidized form (ubiquinone) (maximally 10 % in oxidized form). Chronic degenerative diseases significantly shift this ratio (e.g. multiple sclerosis to up to 30 %). On the basis of the determined laboratory values and anamnestic information about the primary disease the risk of increased oxidized Q10 shares can be estimated. Biovis GmbH offers a computer supported risk score calculation on their homepage (www.biovis.de). The determination of the individual dosage becomes significantly easier.

In case of increased demand of Q10 in cell membranes the biosynthesis of Q10 is increased and/ or Q10 existing in the cell is shifted. Therefore coenzyme Q10 reserves are recommendable for preventive or / and therapeutic measures.

**Therapeutic Effects** of Q10 were observed in case of:

- **Myocardial failure**
- **Immune deficiencies**
- **Parkinson’s and Huntington’s disease**
- **Encephalomyelopathy and ataxia**
- **Cancer**
- **Diabetes and age related macular degeneration (AMD)**
- **Migraine and tinnitus**
- **Muscle dystrophy and others**

**Laboratory:**

Plasma levels of 0.85 µg/ml are standard. Values below 0.6 µg/ml are regarded as critical. From a preventive point of view the plasma levels should at least reach 1.0 µg/ml. The therapeutic target value is >2.5 µg/ml.

The level of Q10 in plasma depends on the cholesterol value. High cholesterol values automatically come along with increased Q-10 values and may possible hide deficiency.

The determination of the lipid-corrected Q10 value – which is only done by biovis - avoids misinterpretations of the measuring values.

From a preventive medical point of view the cholesterol corrected value should not be below 0.200 µmol/mmol

**Main functions** of Q10 in the cell:

- 1. Safe-guarding the energy production**
- 2. Maintenance of anti-oxidative and pro-oxidative balance**
- 3. Membrane protection**
- 4. Control of the cell metabolism (including gene expression, apoptosis)**
- 5. Direct vessel protection**

**Do you have additional questions?**

**Please call us – we gladly provide information.**

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