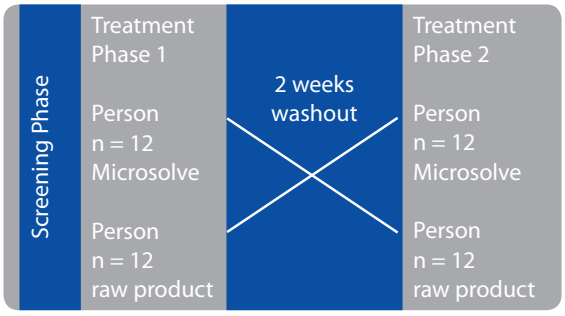
Study for determining the Bioavailability of Coenzyme Q10 and Vitamin E

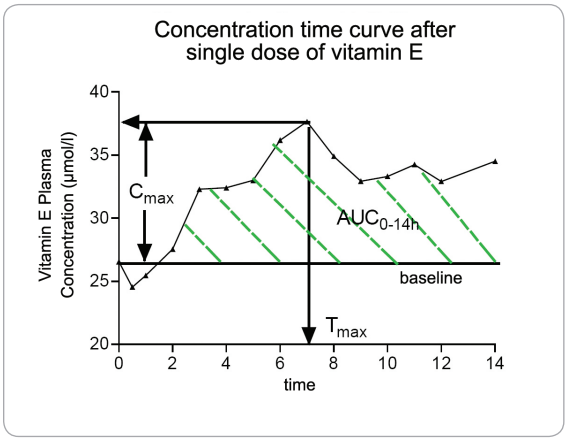
Within the scope of the study, the bioavailability of a micellized coenzyme Q10 and vitamin E formula (microsolve) was analyzed in a defined group against the raw product (powder form in capsule).
The objective of the study was to characterize the bioavailability in plasma. After intake of the test preparations, blood samples were taken at defined times over a period of 14 hours to determine vitamin E and coenzyme Q10. The selected cross-over design allows a direct comparison between the formulas; meaning that each test person had taken the raw products (vitamin E; coenzyme Q10) as well as the micellized form (microsolve technology).



The study design was assessed by an ethics committee of the German state of Baden-Wuerttemberg. 24 voluntary subjects in good health, 12 men and 12 women respectively, participated in the study. Their fitness was checked by analyzing their medical history, performing a physical examination and determining the routine blood values. The following table briefly summarizes the participating group.

		Permitted area/ Reference area
Age (years)	26,7 ± 6,8	18 - 50
Body Mass Index [kg/m^2]	22,2 ± 2,4	19 - 30
Cholesterol [mg/dL]	189 ± 29	110 - 250
Coenzym Q10 [µmol/L]	0,62 ± 0,14	0,52 - 1,27
Vitamin E [µmol/L]	25,4 ± 4,1	15 - 45

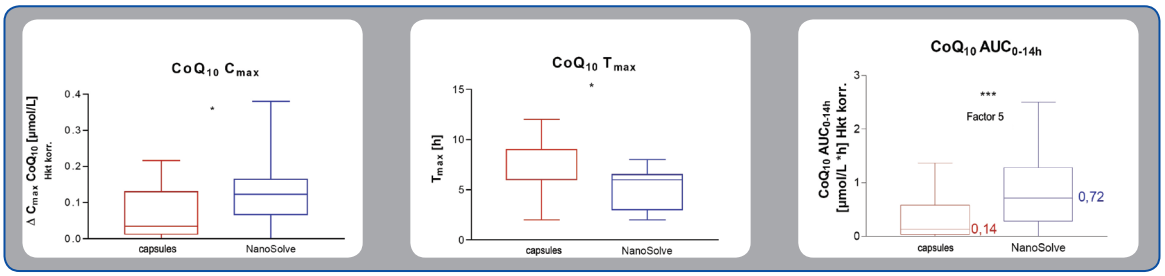
On the whole, a representative group in order to examine the questions was raised.
The tested preparations (100 mg coenzyme Q10 and 120 mg vitamin E) were taken with water as a single dose on an empty stomach. Blood was taken via an indwelling catheter. For the duration of the examination the test persons ate monitored meals, which minimized external influence factors. From the analyzed concentrations of vitamin E and coenzyme Q10 in the blood (HPLC technology) the pharmacokinetic values Cmax, Tmax and AUC were determined in accordance with a single dose.
Bioavailability is one factor to measure how fast and to what extent a substance is absorbed and made available to the body. (In order to take fluid-related concentration fluctuations in the blood into consideration, the plasma percentage values were also corrected.)



The Cmax value represents the maximum increase in concentration of the values considered in the plasma.
Tmax describes the time in which the maximum concentration of the parameters considered is reached in the plasma.
AUC0-14h as the surface under the concentration-time curve is a measurement of general bioavailability.

Results of the study
(Depicted is the distribution of the pharmacokinetic parameters, respectively)

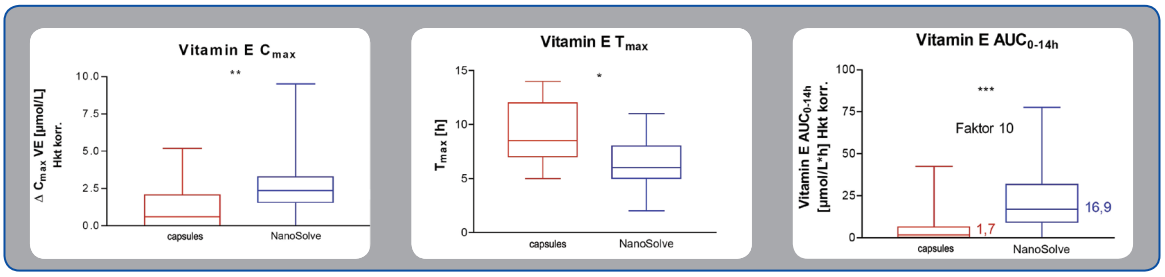
Coenzym Q10



Distinctly recognizable is that significantly higher concentrations were achieved in plasma through microsolve technology and coenzyme Q10 floods the blood quicker and reaches the concentration maximum sooner.

The area below the concentration-time curve is raised significantly with microsolve technology, which means that the body has 5 times more CoQ10 available in the median .

Vitamin E



Analogous to the results of Q10, one also sees here that the microsolve technology achieves a significantly higher concentration in the plasma, vitamin E floods the blood more quickly and reaches the concentration maximum sooner.

The area below the concentration-time curve is increased significantly with microsolve technology, which means that the body has 10 times more vitamin E available in the median (mid value).

Conclusion:

1. **The study's design guarantees standardized conditions with regard to exogenic influential factors**
2. **The group test persons provide a representative group of young healthy people as far as all tested properties were concerned.**
3. **The micellized formula (microsolve) indicates the following properties on the basis of the pharmacokinetic parameters Tmax, Cmax and AUC0-14 h when compared to the equivalent formula (raw product in capsule form)**
   a. microsolve technology produced a significantly higher concentration of coenzyme Q10 and vitamin E in the blood than the equivalent formula
   b. with the aid of microsolve technology Q10 and Vitamin E flood the blood significantly more quickly than the equivalent formula
   c. The area below the concentration time curve is significantly larger with microsolve technology, that means more active ingredients are available to the body.