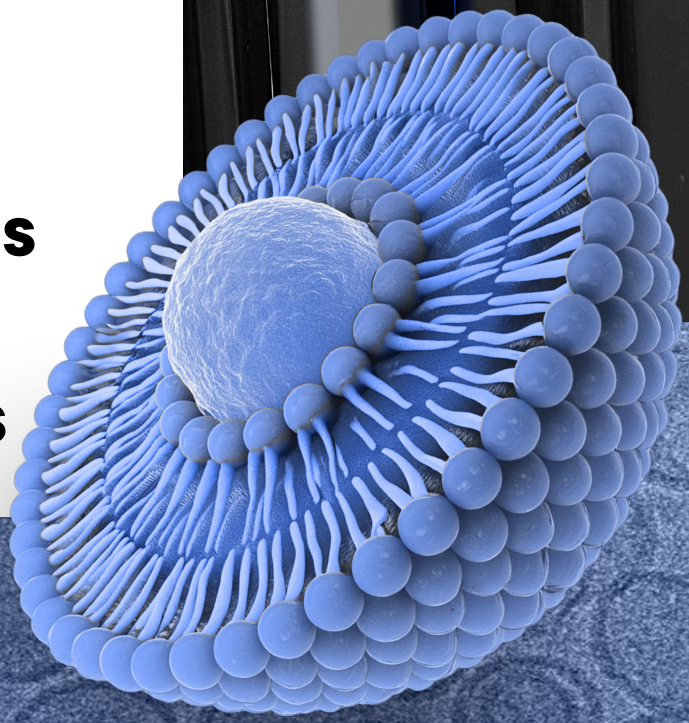
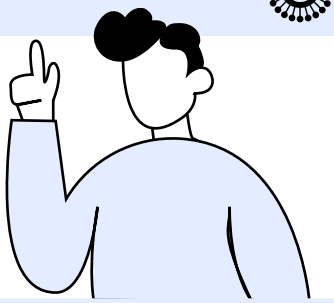
PlantaCORP
advanced liposomal technology

Human Clinical Study on the Comparative Bioavailability of Various Coenzyme Q10 Supplementation Forms



Summary of the Study[1]



Abstract

The purpose of this study was to compare the bioavailability of Coenzyme Q10 in liquid liposomal supplementation form provided by PlantaCorp with other non-liposomal tablet form provided by competitor. Twenty metabolically healthy volunteers were enrolled in the study.

Overall, **the PlantaCorp liposomal Coenzyme Q10 supplement had the highest bioavailability, up to 3.2 times more,** compared to other non-liposomal Coenzyme Q10 in tablet supplementation form tested.

KEYWORDS: Coenzyme Q10, Ubiquinol, Liposomes, Bioavailability, Dietary Supplements, Biohacking.

Product Groups

LLQ10
Liquid Liposomal Coenzyme Q10 100 mg

Manufactured by PlantaCorp in Hamburg, Germany

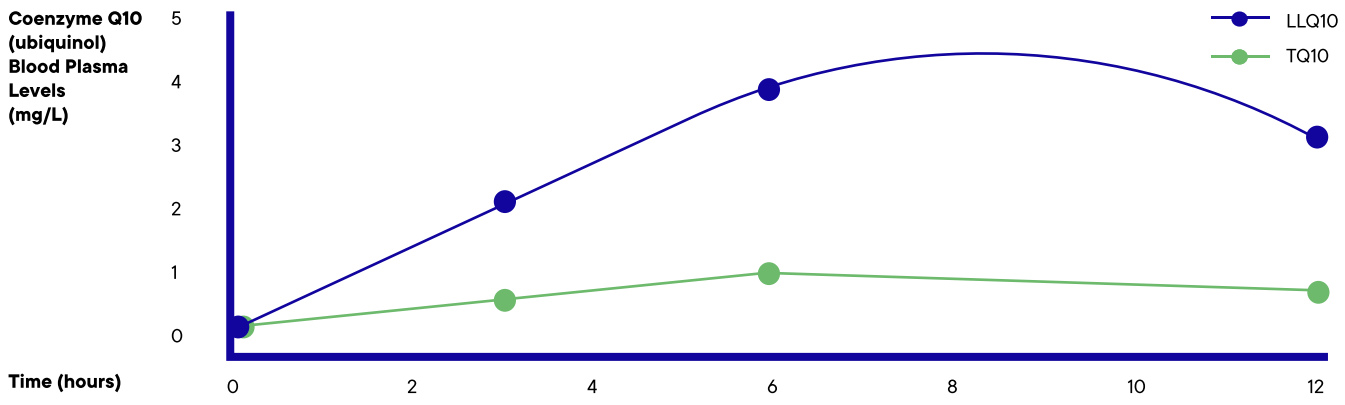
TQ10
Non-liposomal tablet Coenzyme Q10 100 mg

Manufactured by Competitor in Germany

Results

During the study, Coenzyme Q10 (ubiquinol) blood plasma levels were measured over time after the intake of Coenzyme Q10 100 mg in two supplementation forms, namely LLQ10, and TQ10.

The results have shown that the PlantaCorp liquid liposomal Coenzyme Q10 supplement (LLQ10) has **2.8 times** higher bioavailability than the competitor's non-liposomal tablet Coenzyme Q10 (TQ10). Liposomal Coenzyme Q10 also **maintained elevated plasma levels throughout the entire study period,** proving sustained highest concentrations during daily supplementation.



[1]See the full study from page 2.

Introduction

Coenzyme Q10 (Ubiquinol and Ubiquinone) is a fat-soluble molecule essential for energy production in the body, particularly in high-energy organs such as the heart, liver, and kidneys.[1] It is widely used as a supplement and has been shown to provide clinical benefits in the prevention and treatment of heart failure.[2] Despite its potential, Coenzyme Q10 suffers from poor bioavailability, driving the need for advanced delivery systems.[3] **Liposomal encapsulation have emerged as a highly effective solution for improving Coenzyme Q10 supplementation.** The current study confirms that **PlantaCorp's unique advanced liposomal technology, LipoSone™**, maximizes Coenzyme Q10 bioavailability, outperforming conventional supplementation forms such as tablets.

Method

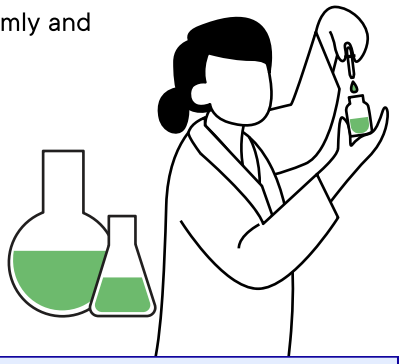
The current study was a randomized, controlled, two-group trial investigating the effect of Coenzyme Q10 100 mg in two different formulations: liquid liposomal Coenzyme Q10 provided by PlantaCorp (LLQ10) and non-liposomal Coenzyme Q10 in tablet form provided by competitor (TQ10).

Participants

Twenty (20) metabolically healthy volunteers were enrolled in the study. They were randomly and evenly assigned to one of the two supplementation groups.

Exclusion criteria for participants were:

- ✖ <20 and >50 years of age
- ✖ Any diagnosis of chronic condition(s)
- ✖ BMI outside of the normal category range (18.5–24.9kg/m2)
- ✖ Presence of acute illness
- ✖ Use of drugs or dietary supplements on a frequent and/ or mandatory basis



Measurements	LLQ10*	TQ10*
Age (years)	26 ± 5	28 ± 5
Females (%)	40	50
BMI (kg/m2)	20 ± 1	20 ± 2
Systolic BP (mmHg)	121 ± 12	119 ± 13
Diastolic BP (mmHg)	79 ± 5	78 ± 8

Table 1. Participant Anthropometric Data

** Mean standard deviation n=10*

Active Substances & Supplementation Groups

a. Liquid liposomal Coenzyme Q10 (LLQ10): PlantaCorp's Coenzyme Q10 100 mg in liposomal liquid form, manufactured in Hamburg, Germany.

b. Non-liposomal tablet Coenzyme Q10 (TQ10): Competitor's Coenzyme Q10 100 mg in tablet form, manufactured in Germany.

Dosage and Blood Collection

Participants in the designated supplement groups, while in a fasted state, received **a 100 mg oral dose of Coenzyme Q10.** Blood samples were taken initially before the supplement was consumed (baseline) and then at intervals of 1, 2, 3, 6 and 12 hours following the intake. These samples were microcentrifuged for 12 minutes, cooled to 2°C, and analysed for plasma ubiquinol levels using a Shimadzu 8040 triple quadrupole mass spectrometer in MRM mode with electrospray ionization in positive ion mode.

Data

All participants successfully completed the study. They were predominately in their late twenties, with an equal distribution of males and females. All were characterized by healthy Body Mass Index (BMI) and blood pressure levels, detailed by both systolic and diastolic measurements. Participant anthropometric data is provided in **Table 1.**

Each group's average blood plasma Coenzyme Q10 levels over time are graphically represented in **Figure 1**. Pharmacokinetic parameters, such as the peak plasma concentration of Coenzyme Q10 (C_{max}) and the time to reach this peak (T_{max}), are documented in **Table 2**.

The area under the concentration-time curve (AUC_{0-t}) was calculated from dosing to the last measurable concentration using the trapezoidal rule, indicating the total exposure to the active ingredient over time. The incremental area under the curve (iAUC) adjusts the AUC for baseline variations. The Oral Bioavailability Value (OBV) was determined by comparing the liposomal and non-liposomal $iAUC_{0-t}$ values.

Results

A temporal analysis of ubiquinol plasma levels reveals that:

At baseline, both the LLQ10 and TQ10 supplementation groups exhibit similar plasma levels.

After 3 hours, the LLQ10 group achieves plasma Coenzyme Q10 levels that are **over 60% higher** than those of the TQ10 group.

After 6 hours, Coenzyme Q10 levels in the LLQ10 group are **3.2 times higher** than those in the TQ10 group.

After 12 hours, both groups reach their maximum plasma levels; however, the LLQ10 group maintains significantly elevated levels, while the TQ10 group's plasma levels remain nearly unchanged from baseline.

Considering the **iAUC** values, the outcomes suggest:

The liposomal group has an OBV **2.8 times** greater than the tablet group.

Measurements	LLQ10	TQ10
C_{max} (µg/L)	3.31	0.93
T_{max} (hours)	12	12
AUC_{0-t} (mg*h/L)	28.17	9.29
$iAUC_{0-t}$ (mg*h/L)	21.12	7.47
OBV	2.83	

Table 2. Pharmacokinetic Parameters Data

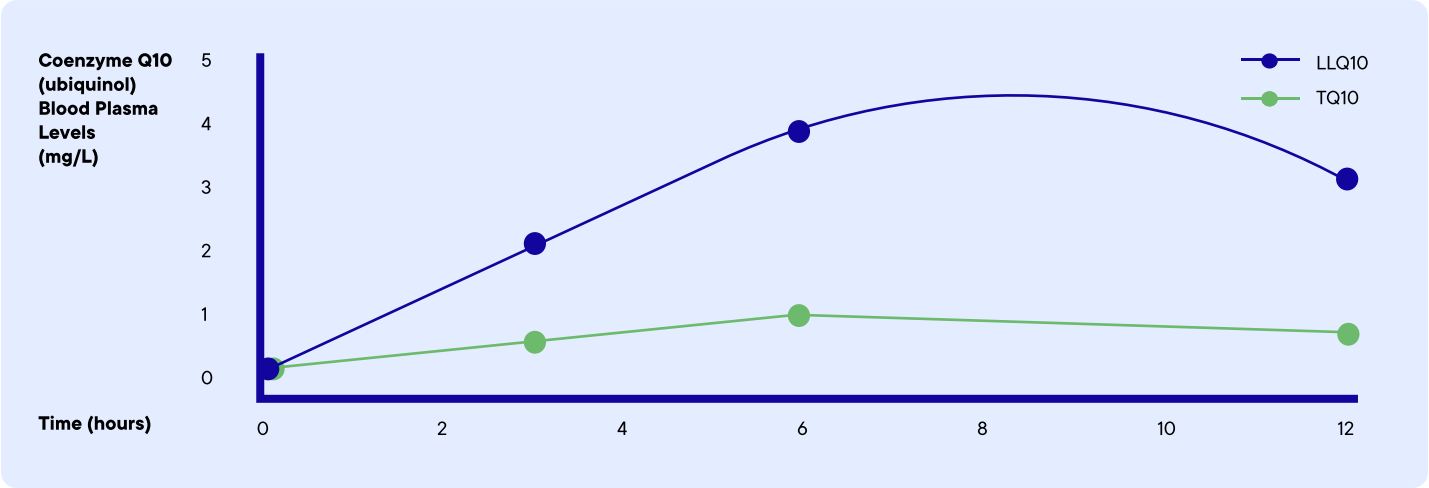


Figure 1. Ubiquinol blood plasma levels collected over time in two supplementation groups, namely LLQ10 liquid liposomal form manufactured by PlantaCorp, and TQ10 tablet product manufactured by competitor.

Discussion and Conclusion

The present study demonstrates that PlantaCorp's liposomal Coenzyme Q10 exhibits **the highest bioavailability** among the tested groups. Specifically, LLQ10 has **up to 3.2 times** higher bioavailability than the competitor's non-liposomal tablet form (TQ10).

After just three hours, ubiquinol plasma levels in the liposomal group were **over 60% higher** than those in the non-liposomal group. Furthermore, the LLQ10 group **maintained elevated plasma ubiquinol levels** throughout the **entire 12-hour** duration of the study. In contrast, the TQ10 group showed no significant increase.

These findings underscore the substantial impact of liquid liposomes on Coenzyme Q10 bioavailability and highlight the superior performance of PlantaCorp's liposomal formulations.

Overall, PlantaCorp's unique advanced liposomal technology, LipoSone™, is the most effective way to deliver Coenzyme Q10 to the bloodstream while maintaining the highest blood plasma levels for up to 12 hours.

1. Role of Coenzyme Q10 in human life. Kumar et al. Research Journal of Pharmacy and Technology, 2016, 9 (6): 635–640. DOI: 10.5958/0974-360X.2016.00121.9.
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3. Coenzyme Q10 Metabolism: A Review of Unresolved Issues. Mantle et al. International Journal of Molecular Science, 2023, 24(3), 2585. DOI: 10.3390/ijms24032585

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