

Nationale Institute of Public Health

Šrobárova 49/48, 100 00 Prague 10

issues

CERTIFICATE OF SAFETY

We hereby confirm that the ingredients and results of laboratory test of the Food Supplement

BrainMax® LIQUID LIPOSOMAL VITAMIN C AND ZINC KIDS

**Applicant: BRAINMARKET s.r.o., Vítkovice 3053, 703 00 Ostrava,
Czech Republic**

complies

with Czech Food Law No 110/1997, Decree No 58/2018 on Food Supplements and the composition on foodstuffs, Regulation (EU) No 1169/2011 on the provision of food information to consumers, Regulation (EC) No 1925/2006 of EP and C on the addition of vitamins and minerals and certain other substances to foods, Commission Regulation (EC) No 1170/2009 sets the list of vitamin and minerals and their forms that can be added to foods, including food supplements and Commission Regulation (ES) No 915/2023 setting maximum levels for certain contaminants in foodstuffs

Supplementary information:

Product was assessed and registered by NIPH Prague

(Čj. SZÚ/17822/2025, EX 251504 from 10.3.2026)

and tested by the accredited laboratories of the National Institute of Public Health Prague, Testing Laboratory No 1206, Šrobárova 49/48, 100 00 Prague 10, Czech Republic

Protocol No 4/26/039, No 183/26/17822

Certificate was issued by NIPH on the request of the applicant.

Validity of the Certificate till 16.3.2029

The number of Certificate: 183-051/26

Date and place of issue: 16.3.2026, Prague

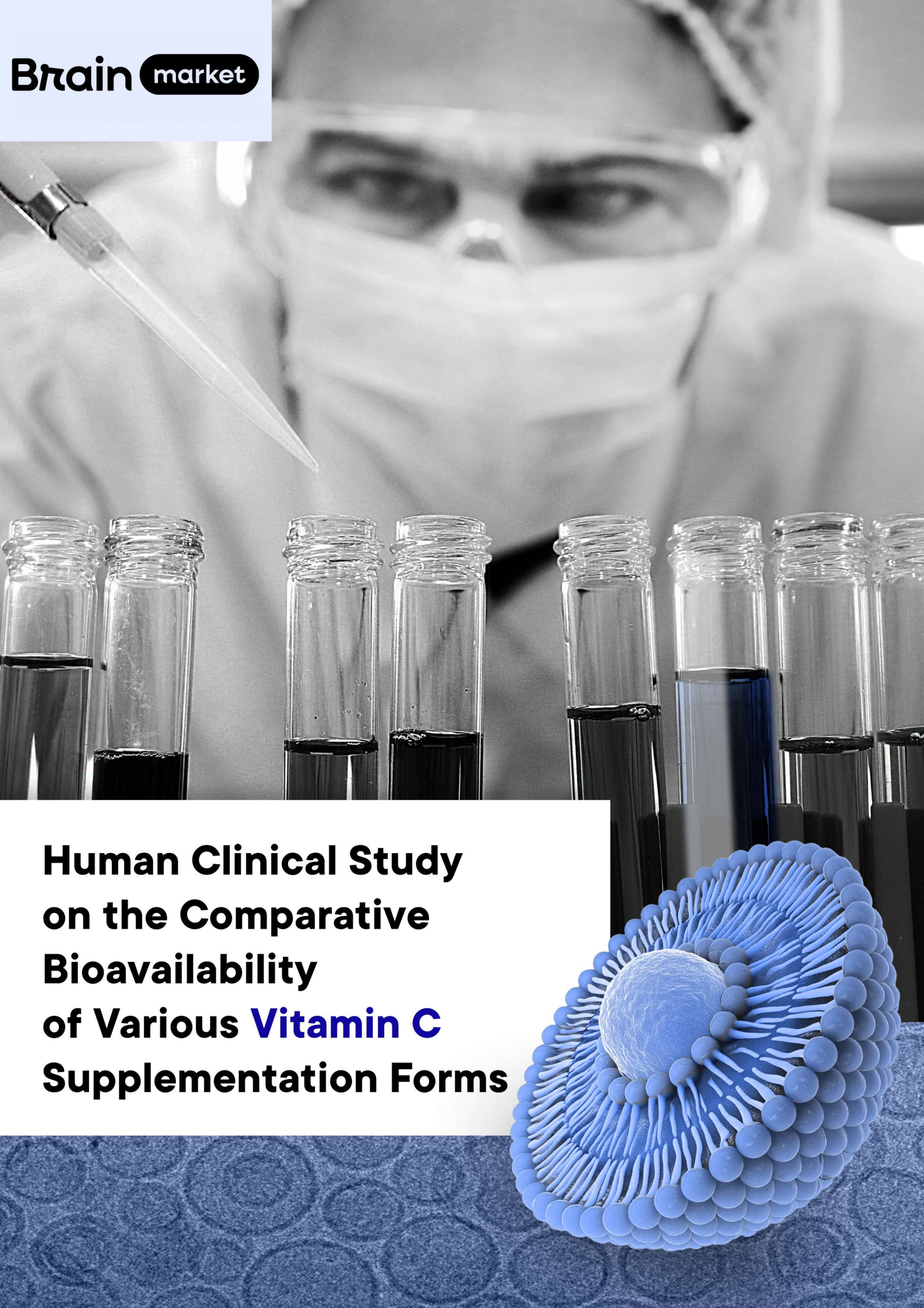
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**Human Clinical Study
on the Comparative
Bioavailability
of Various **Vitamin C**
Supplementation Forms**

Summary of the Study^[1]



Abstract

The purpose of this study was to compare the bioavailability of liposomal and non liposomal vitamin C provided by competitors with supplement BrainMax Liquid Liposomal Vitamin C. Forty metabolically healthy volunteers were enrolled in the study.

Overall, **the BrainMax Liquid Liposomal Vitamin C had the highest bioavailability, up to 21 times more**, compared to other vitamin C supplementation forms tested.

KEYWORDS: Vitamin C, Liposomes, Bioavailability, Dietary Supplements, Biohacking.

Product Groups

LLA

Liquid Liposomal
Vitamin C
1000 mg

Manufactured for Brainmarket

LLB

Liquid Liposomal
Vitamin C
1000 mg

Manufactured by Competitor
in the Netherlands

NL

Non-liposomal
Vitamin C
1000 mg

Manufactured by Competitor
in the Netherlands

PL

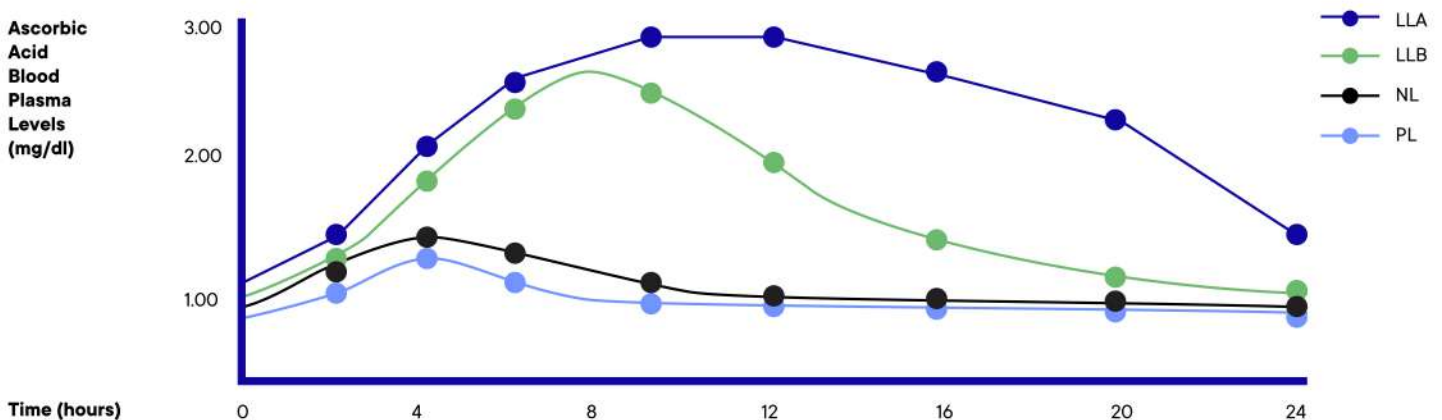
Liposomal Vitamin C
In Powder Form
1000 mg

Manufactured by Competitor
in the Netherlands

Results

During the study, ascorbic acid (AA) blood plasma levels were measured over time after the intake of vitamin C 1000 mg in four supplementation forms, namely LLA, LLB, PL, and NL.

The results have shown that the BrainMax Liquid Liposomal Vitamin C (LLA) has **1.92 times** higher bioavailability than the competitor's liquid liposomal vitamin C (LLB), **21.6 times** higher bioavailability than the liposomal vitamin C in powder form (PL), and **12 times** higher bioavailability than the non-liposomal vitamin C (NL).



^[1] See the full study from page 2.

Introduction

Ascorbic acid (AA), widely known as **vitamin C**, is a critical nutrient integral to several biological functions. These functions encapsulate supporting immune system efficacy, facilitating normal metabolic and psychological activities, protecting cellular structures from oxidative damage, and reducing exhaustion and fatigue.^[1] Studies have shown that **the utilization of liposomes can substantially enhance the bioavailability** of numerous nutrients, including vitamin C.^[2] The current study confirmed that the unique advanced liposomal technology LipoSone™, used in BrainMax, effectively enhances vitamin C bioavailability, outperforming other supplementation forms tested, such as non-liposomal vitamin C, liposomal vitamin C in powder form, and a competitor’s liquid liposomal vitamin C.

Method

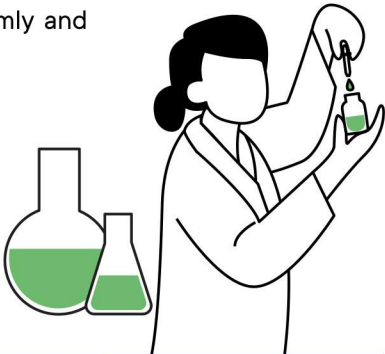
The current study was a randomized, controlled, four-group trial on the effect of vitamin C 1000 mg in four different formulations: BrainMax Liquid Liposomal Vitamin C, liquid liposomal vitamin C by competitor (LLB), liposomal vitamin C in powder form by competitor (PL), and a non-liposomal vitamin C by competitor (NL).

Participants

Forty (40) metabolically healthy volunteers were enrolled in the study. They were randomly and evenly assigned to one of the four 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	LLA*	LLB*	PL*	NL*
Age (years)	26 ± 5	26 ± 5	27 ± 6	28 ± 7
Females (%)	50	40	60	40
BMI (kg/m2)	20 ± 2	21 ± 2	21 ± 1	20 ± 2
Systolic BP (mmHg)	120 ± 12	118 ± 13	117 ± 10	119 ± 13
Diastolic BP (mmHg)	78 ± 9	78 ± 8	80 ± 9	78 ± 7

Table 1. Participant Anthropometric Data

* Mean standard deviation n=10

Active Substances & Supplementation Groups

- a. Liquid liposomal product A (LLA):** BrainMax Liquid Liposomal Vitamin C
- b. Liquid liposomal product B (LLB):** Competitor’s AA 1000 mg in liposomal liquid form, manufactured in the Netherlands.
- c. Powdered liposomal product (PL):** Competitor’s AA 1000 mg in powder form, manufactured in the Netherlands.
- d. Non-liposomal product (NL):** Competitor’s AA 1000 mg in tablet form, manufactured in the UK.

Dosage and Blood Collection

Participants in the designated supplement groups, while in a fasted state, received a **1000 mg oral dose of vitamin C**. Blood samples were taken initially before the vitamin was consumed (baseline) and then at intervals of 2, 4, 6, 8, 10, 12, 16, 20, and 24 hours following the intake of the vitamin. These samples were promptly microcentrifuged, cooled to 2°C, and subjected to plasma ascorbic acid (AA) level quantification by High-Performance Liquid Chromatography (HPLC).

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 ascorbic acid (AA) levels over time are graphically represented in **Figure 1**. Pharmacokinetic parameters, such as the peak plasma concentration of ascorbic acid (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 AA plasma levels reveals that:

After 2 hours, the **LLA** group displayed distinctly higher AA plasma concentrations and continued to exhibit elevated levels for the subsequent 24 hours when compared to other groups.

After 4 hours, both the **PL** and **NL** groups reached their peak AA plasma concentrations, which then returned to baseline levels over the next 8 hours.

After 8 hours, the **LLA** group attained its maximal AA plasma concentration, maintaining it for an additional 4 hours before gradually decreasing. In contrast, the **LLB** group peaked at 8 hours but then swiftly dropped back to baseline within the subsequent 14 hours.

After 24 hours, the AA plasma levels in the **LLA** group were akin to those observed at 2 hours post-supplementation, whereas the levels in all other groups were near baseline.

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

The liposomal group LLA has an OBV **1.9 times** greater than LLB group, **21.6 times** greater than PL group, and **12 times** greater than NL group.

LLA's bioavailability exceeds **PL** by **more than 20 times** due to the PL's loss of structural integrity and protective function in liposomes when dehydrated.

Measurements	LLA	LLB	PL	NL
C_{max} (mg/dL)	2,78	2,51	0,97	1,12
T_{max} (hours)	12	8	4	4
AUC_{0-t} (mg*hr/dL)*	51,86	34,51	15,19	17,61
$iAUC_{0-t}$ (mg*hr/dL)*	36,76	19,15	1,70	3,02
OBV		1,92	21,64	12,17

Table 2. Pharmacokinetic Parameters Data

* AUC_{0-t} and $iAUC_{0-t}$ calculated using trapezoidal rule

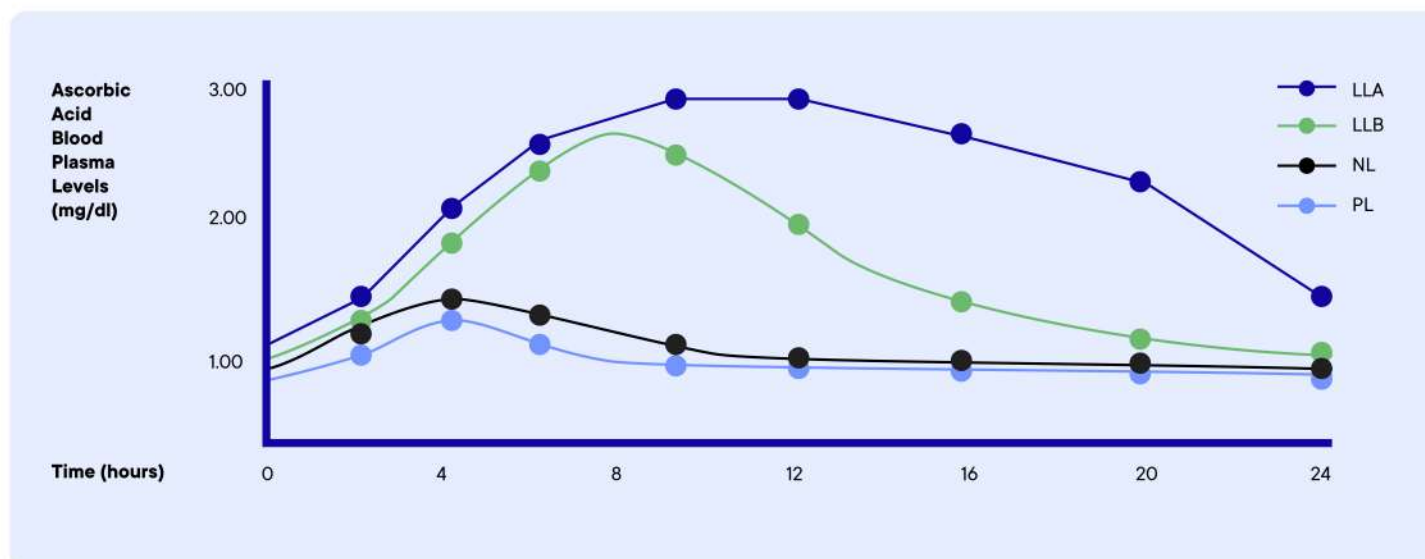


Figure 1. Ascorbic acid (AA) blood plasma levels measured over time after the intake of vitamin C 1000 mg in four supplementation forms, namely LLA BrainMax Liquid Liposomal Vitamin C, LLB liquid liposomal vitamin C manufactured by competitor, PL liposomal vitamin C in powder form manufactured by competitor, NL non-liposomal vitamin C manufactured by competitor.

Discussion and Conclusion

The study demonstrates that BrainMax Liquid Liposomal Vitamin C (LLA) exhibits the **highest bioavailability** among the tested groups. Specifically, LLA has **1.92 times** higher bioavailability than the competitor's liquid liposomal vitamin C (LLB), **21.6 times** higher bioavailability than competitor's liposomal vitamin C in powder form (PL), and **12 times** higher bioavailability than competitor's non-liposomal vitamin C (NL).

Additionally, LLA **maintained elevated plasma ascorbic acid (AA) levels** for the **entire 24-hour** duration of the study. In contrast, the LLB group showed significant increases for only 8 hours, while the PL and NL groups showed increases for just 4 hours.

These findings underscore the substantial impact of liquid liposomes on vitamin C bioavailability and highlight **the superior performance BrainMax liposomal formulations**. The observed differences between the two liquid liposomal vitamin C products may be attributed to variations in production methods and quality standards, which can significantly affect liposome properties such as stability, size, and encapsulation efficiency. These properties, in turn, influence the effectiveness of liposomes in delivering the active ingredient to the bloodstream. However, these specific factors were not measured in the present study.

Overall, the advanced liposomal technology LipoSone™, used in BrainMax supplements, is the most effective way to deliver vitamin C to the bloodstream while maintaining the highest blood plasma levels for up to 24 hours.



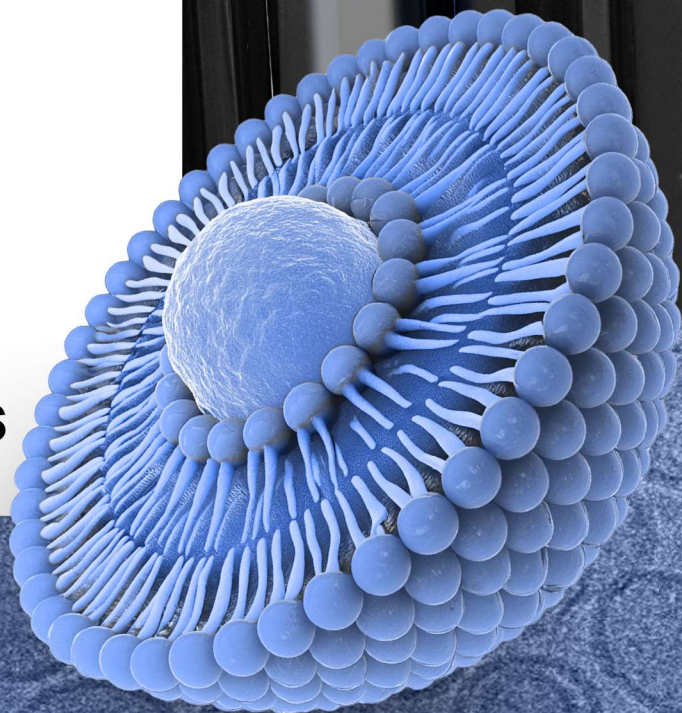
1. Vitamin C Fact Sheet for Health Professionals. National Institutes of Health ODS. <https://ods.od.nih.gov/factsheets/VitaminC-HealthProfessional/>. Published 2020.
 2. Davis JL, Paris HL, Beals JW, et al. Liposomal-encapsulated Ascorbic Acid: Influence on Vitamin C Bioavailability and Capacity to Protect against Ischemia-Reperfusion Injury. *Nutr Metab Insights*. 2016; NMIS39764. doi: 10.4137/nmis39764
 Statistic tools used: two-way ANOVA. Statistical significance $p=0.05$. All analyses were conducted using the statistical software Jamovi 1.2.17, unless otherwise stated.

Acknowledgement

Study conducted in collaboration with: Surya Research Clinics
 D1002, Purva Venezia apartments, Yelahanka Newtown Bengaluru. KA 560065, India



**Human Clinical Study
on the Comparative
Bioavailability
of Various **Zinc**
Supplementation Forms**



Summary of the Study^[1]



Abstract

The purpose of this study was to compare the bioavailability of liposomal Zinc provided for BrainMarket with other non-liposomal Zinc provided by competitors. Forty metabolically healthy volunteers were enrolled in the study.

Overall, **the BrainMax supplements with liposomal zinc had the highest bioavailability, up to 3.82 times more**, compared to other Zinc supplementation forms tested.

KEYWORDS: Zinc, Mineral, Liposomes, Bioavailability, Dietary Supplements, Biohacking.

Product Groups

LLZA

Liquid Liposomal
Zinc Ascorbate
25 mg

Manufactured for BrainMarket

LLZG

Liquid Liposomal
Zinc Gluconate
25 mg

Manufactured for BrainMarket

PZA

Zinc Ascorbate
In Powder Form
25 mg

Manufactured by Competitor
in Germany

PZG

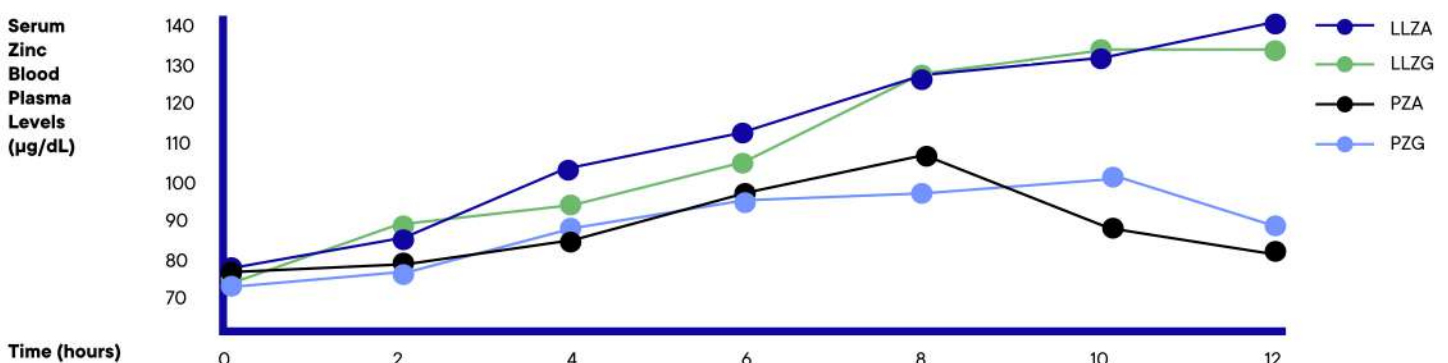
Zinc Gluconate
In Powder Form
25 mg

Manufactured by Competitor
in the Netherlands

Results

During the study, Zinc blood plasma levels were measured over time after the intake of Zinc 25 mg in four supplementation forms, namely LLZA, LLZG, PZA, and PZG.

The results have shown that the BrainMax supplements with liquid liposomal Zinc ascorbate (LLZA) has **3.82 times** higher bioavailability than the competitor's Zinc ascorbate in powder form (PZA), and BrainMax supplements with liquid liposomal Zinc gluconate supplement (LLZG) has **2.73 times** higher bioavailability than the competitor's Zinc gluconate in powder form (PZG).



^[1] See the full study from page 2.

Introduction

Zinc is a vital mineral that plays a crucial role in numerous bodily functions, making adequate intake essential to prevent deficiencies.^[1] A key challenge of the dietary supplement industry has been improving Zinc absorption and bioavailability.^[2] While traditional Zinc supplementation methods have low absorption rates,^[3] liposomal technology can be an excellent alternative to encapsulate Zinc and increase its bioavailability. The current study confirmed **that the unique advanced liposomal technology LipoSone™, used in BrainMax supplements, effectively enhances** Zinc bioavailability, outperforming other supplementation forms tested, such as non-liposomal powder Zinc.

Method

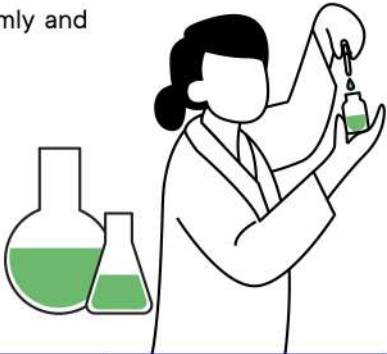
The current study was a randomized, controlled, four-group trial on the effect of Zinc 25 mg in four different formulations: BrainMax liquid liposomal Zinc ascorbate (LLZA), BrainMax liquid liposomal Zinc gluconate (LLZG), non-liposomal Zinc ascorbate in powder form by competitor (PZA), and a non-liposomal Zinc gluconate in powder form by competitor (PZG).

Participants

Forty (40) metabolically healthy volunteers were enrolled in the study. They were randomly and evenly assigned to one of the four 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	LLZA*	LLZG*	PZA*	PZG*
Age (years)	28 ± 5	27 ± 4	28 ± 7	29 ± 7
Females (%)	50	40	60	40
BMI (kg/m2)	20 ± 2	20 ± 1	20 ± 1	20 ± 2
Systolic BP (mmHg)	119 ± 11	120 ± 9	119 ± 13	119 ± 13
Diastolic BP (mmHg)	78 ± 7	78 ± 7	80 ± 5	78 ± 7

Table 1. Participant Anthropometric Data

* Mean standard deviation n=10

Active Substances & Supplementation Groups

- a. Liquid liposomal Zinc ascorbate (LLZA):** BrainMax supplement with Zinc ascorbate 25 mg in liposomal liquid form.
- b. Liquid liposomal Zinc gluconate (LLZG):** BrainMax supplement with Zinc gluconate 25 mg in liposomal liquid form.
- c. Powdered Zinc ascorbate (PZA):** Competitor’s Zinc ascorbate 25 mg in powder form, manufactured in Germany.
- d. Non-liposomal product (PZG):** Competitor’s Zinc gluconate 25 mg in powder form, manufactured in the Netherlands.

Dosage and Blood Collection

Participants in the designated supplement groups, while in a fasted state, received a **25 mg oral dose of Zinc**. Blood samples were taken initially before the supplement was consumed (baseline) and then at intervals of 2, 4, 6, 8, 10, and 12 hours following the intake of Zinc. These samples were promptly microcentrifuged for 12 minutes, cooled to 2°C, and subjected to plasma Zinc level quantification by spectrophotometry.

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 Zinc levels over time are graphically represented in **Figure 1**. Pharmacokinetic parameters, such as the peak plasma concentration of Zinc (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 Zinc plasma levels reveals that:

At baseline, all supplementation groups exhibit similar plasma Zinc levels.

After 4 hours, a nearly linear increase in plasma Zinc levels is observed across all groups.

After 6 hours, the liposomal groups show a more pronounced rise in plasma Zinc levels compared to the non-liposomal groups.

After 8 hours, plasma Zinc levels in the liposomal groups appear to plateau, with a significant gap emerging between the liposomal and powder groups.

After 10 hours, the liposomal groups maintain high and stable plasma Zinc levels, whereas the powder groups begin to decline.

After 12 hours, the liposomal groups continue to sustain elevated and steady plasma Zinc levels, while the non-liposomal groups' levels decrease further, approaching baseline values.

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

Liposomal Zinc ascorbate has an **OBV 3.82 times** higher than non-liposomal powder Zinc ascorbate. Liposomal Zinc gluconate has an **OBV 2.73 times** higher than non-liposomal powder Zinc gluconate.

The LLZA and LLZG groups exhibit comparable AUC and iAUC values, indicating that the liquid liposomal delivery system effectively equalizes the bioavailability of minerals from different sources.

Measurements	LLZA	LLZG	PZA	PZG
C_{max} (mg/dL)	130.2	133.0	101.4	97.5
T_{max} (hours)	10	12	8	10
AUC_{0-t} (mg*hr/dL)*	1291.6	1315.9	1072.5	1084.9
$iAUC_{0-t}$ (mg*hr/dL)*	406.0	400.3	105.3	146.5
OBV	1	1	3.82	2.73

Table 2. Pharmacokinetic Parameters Data

* AUC_{0-t} and $iAUC_{0-t}$ calculated using trapezoidal rule

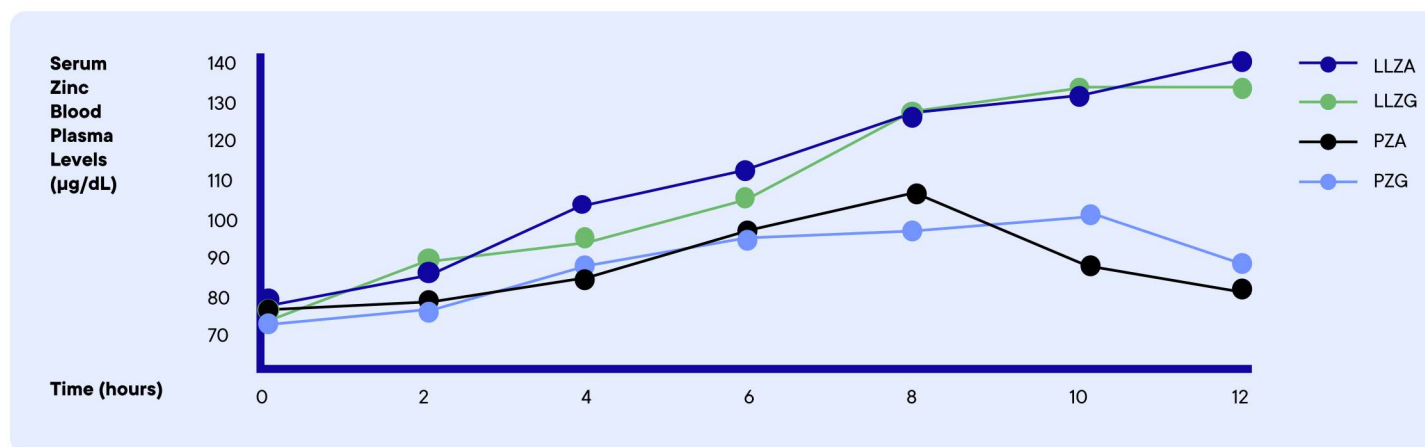


Figure 1. Zinc blood plasma levels measured over time after the intake of Zinc 25 mg in four supplementation forms, namely LLZA liquid liposomal Zinc ascorbate manufactured for BrainMarket, LLZG liquid liposomal Zinc gluconate manufactured for BrainMarket, PZA non-liposomal Zinc ascorbate in powder form manufactured by competitor, PZG non-liposomal Zinc gluconate in powder form manufactured by competitor.

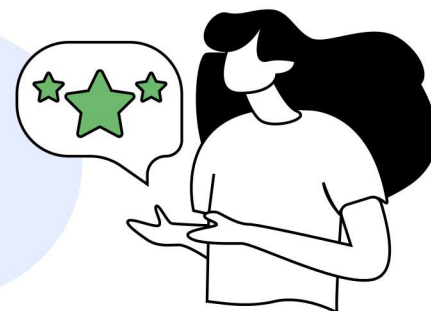
Discussion and Conclusion

The study demonstrates that liposomal Zinc in BrainMax supplements (LLZA and LLZG) exhibits the **highest bioavailability** among the tested groups. Specifically, LLZA has **3.82 times** higher bioavailability than the competitor's powder non-liposomal Zinc ascorbate (PZA), and LLZG has **2.73 times** higher bioavailability than the competitor's powder non-liposomal Zinc gluconate (PZG).

After 8 hours, Zinc plasma levels of the liposomal groups were substantially higher than that of the non-liposomal powder groups. Additionally, LLZA and LLZG **maintained elevated plasma Zinc levels** for the **entire 12-hour** duration of the study. In contrast, the non-liposomal powder groups plasma levels started to decrease after 10 hours. Furthermore, the LLZA and LLZG groups exhibit comparable bioavailability values, suggesting that the liquid liposomal delivery system successfully bridges the gap in mineral bioavailability across different sources.

These findings underscore the substantial impact of liquid liposomes on Zinc bioavailability and highlight **the superior performance of BrainMax formulations**.

The advanced liposomal technology LipoSone™, powering BrainMax Liposomal products, is the most effective way to deliver Zinc to the bloodstream while maintaining the highest blood plasma levels for up to 12 hours.



1. Uwitonze AM, Ojeh N, Murererehe J, Atfi A, Razzaque MS. Zinc Adequacy Is Essential for the Maintenance of Optimal Oral Health. *Nutrients*. 2020, 12(4): 949. doi: 10.3390/nu12040949.
2. Duan M, Li T, Liu B, Yin S, Zang J, Lv C, Zhao G, Zhang T. Zinc nutrition and dietary zinc supplements. *Crit Rev Food Sci Nutr*. 2023, 63 (9): 1277–1292. doi: 10.1080/10408398.2021.1963664.
3. Tang N, Skibsted LH. Zinc bioavailability from whey: Enthalpy-entropy compensation in protein binding. *Food Research International*. 2016, 89 (1): 749–755. doi: 10.1016/j.foodres.2016.10.002.

Acknowledgement

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