

Absorption trials summary

of Cibdol herbal and nutritional
supplements in Liposomes

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Absorption trials summary of Cibdol herbal and nutritional supplements in Liposomes This doc is an addition to the one named: *Absorption of Liposomal CBD and faith of liposomes in GI*, and shortly explains results of other trials made on some Vitamins and other nutrients. For explanation of mechanisms, please check the above mentioned file.

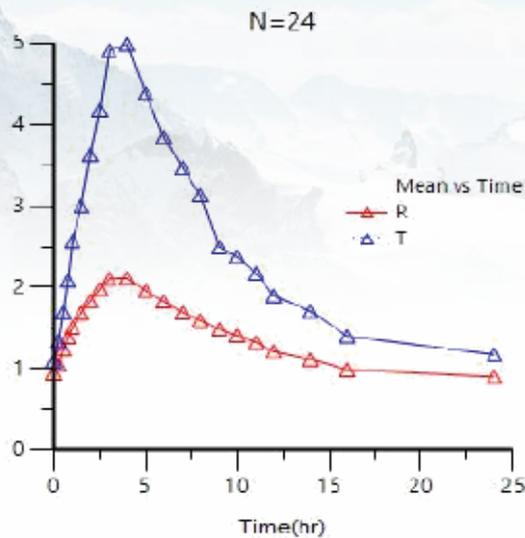
Introduction

Liposomes are a very versatile drug delivery system which have been proven to increase the bioavailability of its active ingredient. Liposomes can be used either intravenously or orally. The intravenous route of drug delivery has the great advantage that it ensure that the liposomes reach the blood stream directly and the liposomes may fuse with target cells really fast. This route may be very suitable for cancer therapies. But for food supplements and regular drugs intravenous administration of liposome encapsulated molecules is much too invasive. A much more user-friendly way of drug administration is the oral delivery route. However some people are sceptic about the feasibility of liposomes surviving the gastro intestinal tract. However enough evidence of the results of oral liposomal drug delivery has been presented over the years. (Amselem et al., n.d.; Degim et al., 2006; Jorge et al., 2008; Kraft, Freeling, Wang, & Ho, 2014; Li & Chen, 2015; Spangler, 1990; Züllli et al., 2006) It may be that the liposomes undergo some lysis due to lipase and other surfactants in the intestinal fluid. However the phosphatidylcholine in the liposomes can reform into micelles and they will act as an absorbance enhancer ensuring the uptake of the lipophilic molecules by the epithelial cells of the intestines.

Vitamin C

Vitamin C is one of the most used, but in general public least misunderstood vitamins. Its function is namely much wider than just supporting immunity. It is cofactor of few dozens enzymes and have unreplaceable role in hundreds of physiological process connected with cell life cycle, cellular breathing, defense system function, normal functioning of nerves, collagen production, etc.. Due to its good bioavailability it may seems odd to incorporate it in the liposomes, but there are few things we have to be aware of:

- Vitamin C, taken orally in form of tablet or capsule can't reach higher blood levels than 220 $\mu\text{mol/l}$, even if large amounts, like few grams, are taken
 - “Therapeutic” blood concentrations that have any impact even only on immunity needs to be higher than 220 $\mu\text{mol/l}$
 - Vitamin C is washed out of the body very quickly, so it needs to be ingested in appropriate amounts every day
 - Stress, poor diet, drinking alcohol, smoking, exposure to pollutants, certain medications and many other factors may increase the need for Vitamin C beyond the recommended daily intake.
- With Vitamin C in liposomal formulation, we can overcome the absorption ceiling observed at traditional formulations.



In our study performed on 24 volunteers we showed that 1g of Liposomal Vitamin C results in more than 6 times higher absorption rates than 1g of Vitamin C in traditional (tablet) form

Vitamin B12

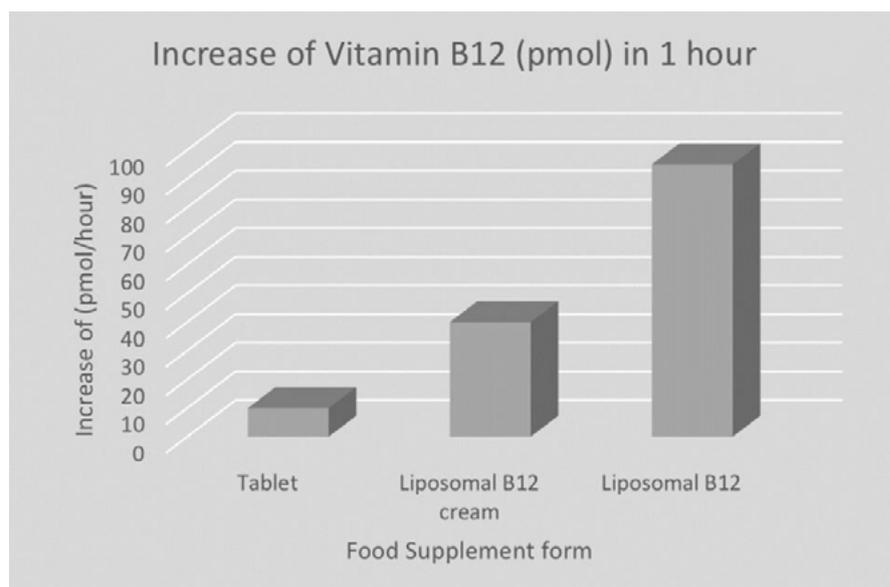
Cobalamin is one of the most badly absorbed nutrient that is essential for our existence. While present in the food of animal origin, it can hardly be found in other foods. Our use special mechanism to absorb this Vitamin. Parts of this mechanism are intrinsic factors found in saliva and in stomach fluid.

If GI tract is affected, like Helicobacter Infection, over production of acid and especially, if PPI (Proton pump inhibitors) are used, there is almost no absorption.

Since intrinsic factors also decrease with stress, age and other GI medical conditions there is of immense importance to add B12 supplementation into our daily diet.

But due to above mentioned reasons not all supplements can guaranty increase in B12 levels.

Ordinary preparations in form of tablets, capsules, sublingual sprays and similar formulations work very slowly, if at all and it may take months before B12 levels are normalized.

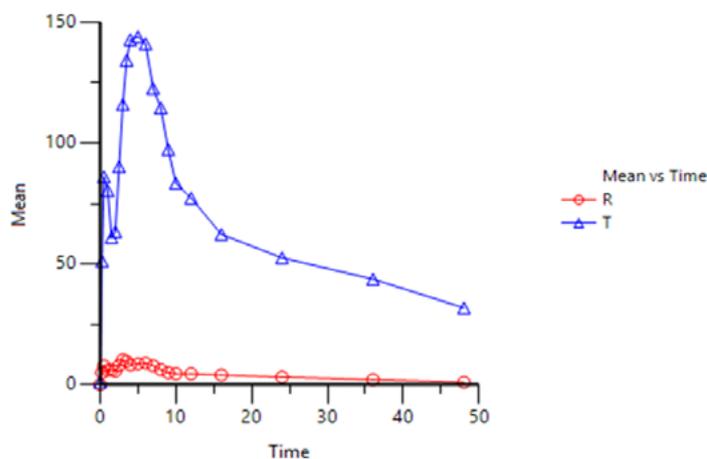


B12 in Liposomal form, can increase the levels in an hour as seen in our proof of concept study. This results are normally achieved by tablets in months. (Only up to 3 pmol/l daily increase of B12 in blood is achieved with tablets of same cobalamin concentrations compared to 90 pmol with liposomal formulation.

Curcumin

Curcumin is one of the most researched natural ingredient with many potentially positive effects on human health. But there is wide gap between the effects observed in the scientific research and in reality. This discrepancy can be attributed in majority to its poor bioavailability. In Liposomal formulation its bioavailability can be increased up to almost 17 times compared to absorption of traditional formulations.

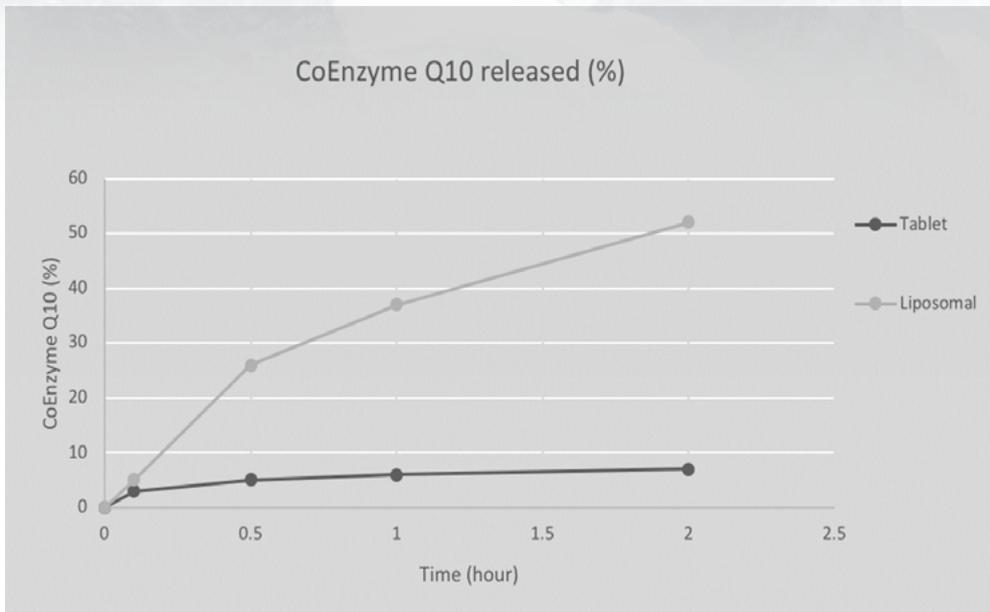
Figure 1: Linear Plot of Mean Plasma Curcumin Concentrations Versus Time (N = 24)



This study performed on 24 volunteers compared bioavailability of 500mg of ordinary curcumin and 500mg of curcumin in Liposomal formulation. The result is 1673% better absorption.

CoQ10

Coenzyme Q10 is one of the most important non-essential nutrients. It is also poorly absorbed in traditional pharmaceutical forms and sparingly present in today's diet.



As shown above in the graph, liposomal formulation increases the absorption of CoQ10 by at least 5 times in highest concentration reached in blood, not even mentioning the total difference.

In conclusion

An overwhelming set of scientific studies all show that the bioavailability of hydrophobic and hydrophilic molecules increases dramatically when given orally in liposomal formulations