

## **Nano droplet CoQ10 delivery promises higher absorption**

By Lorraine Heller

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A new delivery system for CoQ10 could increase its bioavailability by up to seven times, according to its US marketer SourceOne Global Partners.

VESIorb<sup>®</sup>, developed by Swiss firm Vesifact, uses a natural self-assembling colloid delivery system to increase peak absorption<sup>1</sup> rates of CoQ10 – both for supplements and foods.

[Editor Note # 1: bioavailability respectively](#)

According to SourceOne, which has exclusive global licensing rights for the technology, its major differentiation point is that unlike nanotechnology-based systems that use nanoparticles to deliver nutrients, VESIorb<sup>®</sup> uses nanosized droplets, which are absorbed “naturally” by the body<sup>2</sup>.

[Editor Note # 2: The nano sized droplets per se are not absorbed by the enterocytes. It is thought that single molecules dissociate from the droplet, flips to the receiving enterocyte membrane and crosses the membrane by passive diffusion. See also editor note # 3 & 4](#)

“This could potentially allow supplement manufacturers to develop products that deliver through one capsule the same level of CoQ10 into the human bloodstream as is received from seven to ten capsules of soft gel products currently on the market,” Jesse Lopez, founder and CEO of SourceOne, said.

### **COQ10 BENEFITS... AND CHALLENGES**

CoQ10 – or coenzyme Q10 – is a powerful antioxidant, which plays a vital role in the production of chemical energy in mitochondria – the 'power plants' of the cell – by participating in the production of adenosine triphosphate (ATP), the body's co-called 'energy currency'.

It has been studied for its role in cognitive health, heart health, and anti-ageing (in oral and topical formulations). It has also been shown to benefit those suffering from angina, heart attack and hypertension.

Its use in supplements, particularly in the US, has been boosted by the rise in popularity of statin drugs which deplete the body's natural stores of CoQ10. It is well established that statins (also known as HMG-CoA Reductase Inhibitor) lower cholesterol by blocking cholesterol synthesis. However it also blocks CoQ10 production.

"Some people taking statin drugs report a wide range of side effects including muscle pain, weakness, fatigue, memory problem and erectile dysfunction. The side effects could be attributed to the depletion of CoQ10 by statin drugs," says Dr. Julian M. Whitaker, Director of the Whitaker Wellness Institute and Editor of *Health and Healing* newsletter.

The FDA has released a structure function claim stating, "Lipid lowering drugs (statins) have been shown to deplete CoQ10 from the body. If you are currently taking a cholesterol lowering drug, you should consult with your healthcare professional about the benefits of supplementing with CoQ10."

However, CoQ10 is not easily absorbed by the body, which has spurred the need for innovation in the sector to improve its bioavailability – or the levels that reach the human bloodstream.

Although nanotechnology has been one route chosen in the drive for bioavailability, the supplements industry still treads carefully in this field, which remains underdeveloped. A major concern has been the lack of understanding of what happens to nanoparticles once they enter the body<sup>3</sup>.

*Editor Note # 3: It is important to note that the VESIsorb® delivery system is not a solid nano particle, but a fluid droplet. Like the human body that naturally produces 10 nm size micelles in the digestion of fats, the VESIsorb® natural self assembling association colloid is below 100 nm in size. Neither the micelle produced by the body or the association colloid ever enter a cell at the entrocye.*

Just this year, ingredients firm BASF exited the global CoQ10 market after only two years. The reason, it said, was that consumers had not well received the boosted bioavailability and high absorption claims derived from its nanotechnology-driven encapsulation process.

## **NANO DROPLETS**

SourceOne claims its technology would not raise similar concerns because it works by mimicking the body's natural digestive function and absorption process.

VESIorb<sup>®</sup> is described as a natural self-assembling association colloid (or “nano size” association colloid) system. It is used to produce a proprietary CoQ10 formulation called CoQsource<sup>®</sup>, which is a lipid-based formulation that naturally self-assembles on contact with an aqueous phase into an association colloid delivery system.

Essentially, this means that the technology takes insoluble, poorly-absorbed lipophilic (fat-loving) ingredients – such as CoQ10 – and solubilizes them. Once they are exposed to the aqueous environment in the stomach, they self-assemble into tiny fluid droplets.

These droplets are said to be very similar to the nano-sized fluid droplets – or micelles...less than 10NM – that the body normally manages when digesting high-fat foods, in order to make them easier to absorb.

“With our technology, we’ve basically ‘pre-digested’ the CoQ10, almost mirroring the body’s natural digestive process,” Lopez told NutraIngredients-USA.com<sup>4</sup>.

*Editor Note # 4: It is known that poorly water soluble drugs, e.g. fat soluble vitamins are better absorbed when administered after a meal containing fat. One of the reasons for the improved absorption is the enhanced drug solubilization by bile salt mixed micelles, formed from the digestion products of dietary triglycerides (monoglyceride and fatty acids) and bile - a tool developed by nature. The task of naturally formed bile salt-mixed micelles, having a size below 10 nm, is to transport the lipophilic molecules through the aqueous environment of the GI-tract and across the unstirred water layer to the absorptive epithelium. Individual lipid molecules, and not the micelles per se, are the species that enter the absorptive membrane. The precise manner by which lipophilic molecules cross the membrane of the enterocytes is uncertain. Until recently it was generally thought that lipids simply diffuse, individually as monomers through the lipid bilayer of the membrane into the cell. Now there is evidence that dietary fatty acids may be transported across the enterocyte membrane by specific transporter. Once inside the enterocyte, dietary fatty acids and monoglycerides diffuse to the smooth endoplasmic reticulum, where they are resynthesized into triglycerides. Finally, the resynthesized triglycerides packaged into chylomicrons which are secreted into lymph.*

*VESIorb<sup>®</sup>, a lipid-based formulation that naturally self-assembles on contact with an aqueous phase into a colloidal system (so called "association colloid") mimics this mixed micellar absorption pathway. The improvement of oral drug or natural bio-active bioavailability by this technology is broken down into four steps: Step 1: Formation of the colloidal delivery system containing the drug, Step 2: Diffusion of the colloidal system across the unstirred water layer, Step 3: Dissociation of single molecules from the colloidal system and transfer to the absorption epithelium and Step 4 Passive diffusion of single molecules across*

*enterocyte membrane. Since VESIsorb<sup>®</sup> mimics the naturally occurring mixed micellar transport system of the human body it can be considered as a safe technology to improve the absorption of poorly water soluble drugs.*

Although this method has been used before in drug delivery and in cosmetics, Lopez said this was the first time this kind of technology – using natural nano-sized fluid droplets – was being applied to the food and supplement sectors.

## **IMPLEMENTATION AND EFFICACY**

Implementing the technology is “very simple”, he said. CoQSource<sup>®</sup>, which is the oil-based patented formula produced by Vesifact is combined into a soft gel, and triggers enhanced absorption when it comes into contact with fluids in the stomach.

The oil can also be converted into a powder using a proprietary technology, which makes the formula suitable for use in food applications such as nutrition bars or powder for mixing to make drinks.

According to SourceOne, all components and excipients used in CoQsource<sup>®</sup> are considered generally recognized as safe (GRAS) in the US, and are recognized by the most reputable international pharmaceutical compendiums such as USP/NF, EP and JP. Further, all materials are produced under GMP conditions in accordance with all regulatory guidelines.

Vesifact and SourceOne say that the technology achieved peak absorption results of 16.97 percent in a clinical study. This compares to studies involving other CoQ10 ingredients – in powder, oil dispersion and lipid solution delivery systems – which have shown absorption rates of 2.15 percent, 3.34 percent, and 5.44 percent. Multiple studies have shown peak absorption of CoQ10 in powder, water dispersible drinks, and oil dispersion (which is used for typical soft gels) to range from 0.85% to 3.34%.

According to Lopez, this means that supplement manufacturers can make their CoQ10 products around seven to ten times more potent than other soft gels currently on the market.

The technology would result in about 50 percent higher costs for the manufacturer, but ultimately delivers a higher return on investment, he explained.

DSM, which is a supplier of CoQ10 ingredients, told NutraIngredients-USA.com that CoQ10 is generally used in levels of between 30-100mg per serving. There is no RDA for the ingredient, but there is safety data showing that CoQ10 is safe up to around 1,200mg, it said.

## **RUSHING TO MARKET**

Although SourceOne first introduced the technology to industry last year following its alliance with Vesifact, it is only in the last few months that it has started to take off in the US.

It has attracted "*overwhelming interest*" from industry, including the leading players in the supplements category, said Lopez.

Douglas Laboratories, a member of the Atrium Innovations group and a leader in the healthcare professional channel of distribution, recently launched a product using the VESIsorb<sup>®</sup> technology. Its Caplique<sup>™</sup> product is a two-piece liquid-filled hard shell capsule.

GNC, a major supplements firm in the retail distribution sector, will also shortly be launching a soft gel using the technology. Lopez said that launches are also being prepared by other leaders in all key distribution channels, including multi-level marketing, catalogue, independent health food, and food, drug and mass merchandisers.

According to SourceOne, VESIsorb<sup>®</sup> can also be used to improve the absorption of other natural lipophilic bio-actives such as vitamin D, resveratrol, citrus flavonoids, tocotrienols, and gamma tocopherols.

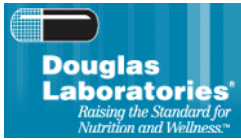
## **About SourceOne<sup>™</sup> Global Partners**



SourceOne<sup>™</sup> Global Partners, headquartered in Chicago, IL, represents a new breed of ingredient supplier, partnering with manufacturing clients to introduce powerfully branded, science-driven products to market with unique product positioning and compelling consumer presence. SourceOne was conceived as a company whose core competency would be to integrate legitimate science with strong trade and consumer branding. It partners with leading suppliers worldwide to source and offer patented ingredients supported by proprietary science as part of turnkey marketing programs that dramatically increases the odds for market success.

For additional information on SourceOne, visit [www.source-1-global.com](http://www.source-1-global.com), email to [info@source-1-global.com](mailto:info@source-1-global.com), or call 1-800-755-4996.

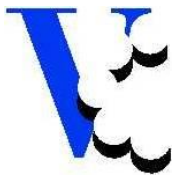
## About Douglas Laboratories



With worldwide headquarters located in Pittsburgh, Pennsylvania, Douglas Laboratories currently offers approximately 700 branded nutraceutical products along with new products introduced on a continuing basis. Working with an experienced research staff of PhDs and a world-renowned medical advisory board, Douglas Laboratories' commitment to bring innovative, clinically supported products to the marketplace to support patient needs is unsurpassed.

For additional information on Douglas Laboratories, visit [www.douglaslabs.com](http://www.douglaslabs.com), email to [nutrition@douglaslabs.com](mailto:nutrition@douglaslabs.com), or call 1-888-DOUGLAB.

## About Vesifact AG



A vital link between current research and private industry, Vesifact is a spin-off from the Swiss Federal Institute of Technology, Zurich (ETH Zürich). Innovative technology and know-how are developed in Vesifact's laboratories and upscaled at its production units. They are then applied to commercial products before being transferred to the marketplace. In this way, Vesifact brings the latest know-how to exactly where it is most needed.

Vesifact laboratories and R&D facilities meet the ever increasing requirements for top-level research, product development, and innovation. Vesifact produces carrier systems that take medical, nutraceuticals, and cosmetic ingredients to enhance performance. Vesifact thus fulfils ever-increasing requirements for innovative dosage forms and application technologies and offers cutting edge-solutions.