Liposomal Vitamin C
The Trojan Horse of Supplement Delivery

Vitamin C supplements are one of the most commonly used supplements in the UK, likely because of the wide range of health benefits it delivers from augmenting the immune system against foreign pathogens through to its anti-inflammatory and antioxidant effects. The majority of Vitamin C products are either desiccated tablets or effervescent products, and while these products generally contain 1g of Vitamin C; the body only absorbs approx. 7-8% of the total amount[1, 2]. This means that for each standard 1g supplement ingested, only 70-80mg is absorbed and plasma Vitamin C levels remain relatively low.

In addition to poor absorbance, doses typically over 2-3g per day often produce laxative effects, which become worse with higher doses and result in lower penetration of the supplement.

High blood levels of vitamin C have been shown to be effective as a primary and supportive treatment for a variety of illnesses and diseases, although elevated levels are not possible with regular supplements. Currently, this is overcome with IV vitamin C, although it is expensive and few practitioners offer this service, which means travel expenses too.

Liposomal Vitamin C has been developed to be a cost effective, safe and widely available substitute for IV Vitamin C, while being able to achieve similar plasma concentrations to IV infusions.

Liposomes are artificial vesicles made up of a phospholipid bilayer similar to the naturally occurring phospholipid bilayer that makes up cell membranes. This bilayer can be used to encapsulate nutrients or pharmaceutical drugs for protection from damaging stomach acids and resistance for absorption. The liposome encapsulates an aqueous solution of the target molecule, so that it cannot escape the boundary of the liposome until the phospholipid bilayer is disrupted e.g. absorption/breakdown in the body. The hydrophobic “tails” of either end of the liposomal wall present a strong boundary for both the solution the liposome is in and the contents of the liposome.

In the body, the liposome protects its contents against the harsh acids of the stomach and allows easier absorption in the stomach and higher intestinal tract. Once absorbed from the GI tract, hepatic breakdown of the liposome occurs and the contents of the liposome are released into the blood stream. The phosphatidylcholine-enriched lipids that are commonly used in the production of liposomes are utilised elsewhere in the body for the production of new cells.

The common rate of absorption found for other liposomal Vitamin C products on the market reaches up to 85%[1, 2], while SureScreen’s product has an addition of vitamin E and further, non-liposomed vitamin C which stimulates absorption in the stomach and increases absorption to approx. 91%.

The protection and preservation of the liposome through the stomach ensure safe transit to the GI tract, since the stomach is also aqueous, which results in a greater yield of absorption. Secondly, liposomes have more affinity for absorption than vitamin C, so it more readily passes through the gut wall than raw vitamin C.

Liposomes are quickly becoming more commonplace in the delivery of targeted treatments and other liposomal supplements are undergoing trials for effectiveness, such as N-acetyl-carnitine and curcumin[4, 5].

As less Vitamin C reaches the bowel less irritation occurs, preventing laxative effects; which allows for mega dosing of Vitamin C for therapeutic benefit. This allows an individual to ingest the same concentration of Vitamin C that would be infused by IV, and anecdotal evidence shows bowel tolerance can be increased to >15g per day. Studies are being undertaken to quantify the average bowel tolerance for liposomal Vitamin C, although as it is thought to vary on the body’s state of deficiency.
Vitamin C has been long thought to aid cancer treatment and in some cases has even been adopted by nutritional clinicians as a sole treatment. There is evidence to support a cancer-cell killing effect of vitamin C and inhibition of metastasis\cite{6}. This is realised by the transient production of hydrogen peroxide in the connective tissues, which destroys tumour cells\cite{1}. As the production of hydrogen peroxide is localized, it also ensures non-toxic therapy. Therapy delivered via liposomes naturally targets white blood cells and this effect can be enhanced by the introduction of ligands to the liposomes\cite{7}.

In addition, vitamin C is well-known as a powerful antioxidant\cite{1}. Antioxidants 'mop up' damaging free radicals in the body produced by incomplete metabolic reactions are one of the principal causes of DNA damage. In turn, this is a principle cause of cancerous mutations in cells and uncontrolled proliferation leading to tumour formation. Vitamin C is often indicated in treatment of illness for immune support too. It is also used as a supportive treatment when an individual is undergoing damaging conventional treatment for cancer e.g. chemotherapy and radiotherapy.

Immune support is key to overcoming illness where standard medication such as antibiotics is often ineffective or counterproductive. Infections with rhinovirus or the influenza viruses are common examples, whereby supporting the immune system minor illnesses can be quickly overcome and recovery time is substantially reduced\cite{8}. In a recent study, those suffering from a minor viral infection recovered quicker if taking liposomal Vitamin C. Indeed, 36% of those with a viral infection recovered in 1-2 days and just over 60% in 3-4 days. This was in comparison to 82% of ill subjects in the placebo control group\cite{9}. In another study it was found that high dose Vitamin C reduced the symptoms of cold and flu in 85% of the test group\cite{8}. Few supplements have these levels of efficacy with routine infections.

In a study into the skin firming effects of high dose Vitamin C, it was found that ingestion of Vitamin C over a 28-day period produced skin firmness and elasticity increases of 32.7%\cite{9}. The effect of Vitamin C on skin aging is thought to be two fold. One of the most closely supported theories of ageing dictates that damage caused by free radicals has the most pronounced effect, which would explain the role of vitamin C\cite{10}. Alongside this benefit, once broken down the phospholipid liposome would deliver individual lipids to be repurposed by the body to produce cells membranes for new cells, which would allow for healthier skin.

In summary, there are many benefits for Vitamin C supplementation, and liposomal vitamin C products allow for a new line of effective supplements increasing the efficacy of oral products up to 13 times in some cases. This technology also allows for mega-dosing to rival IV substitutes and provides a much more affordable alternative for high-dose therapies. This is particularly useful for individuals suffering from cancer and undergoing treatment, or those with poor or suppressed immune systems can also benefit from high dose of Vitamin C\cite{7,8}.

Liposomal vitamin C sets a standard for supplemental absorbance rates that is quickly being applied to other supplements in development by SureScreen.
References:

2: Pauling L, (2014) The bioavailability of different forms of vitamin C Linus Pauling Institute online


9: LivOn Labs (2014) New Research shows liposomal vitamin C makes skin 33% firmer Self Published