QUEST

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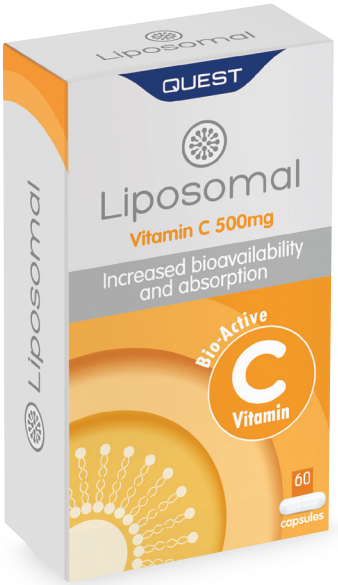
Liposomal

Vitamin C 500mg

Increased bioavailability and absorption



Nutritional Information

One capsule provides:

		*%NRV
Liposomal vitamin C Providing Vitamin C	775 mg 500 mg	 625

*Nutrient Reference Values

Take one to two capsules daily with food. Swallow with water.

SUMMARY

- Advanced delivery of oral vitamin C.
- High bioavailability and absorption of vitamin C.
- Increased cellular delivery of vitamin C.
- Liposomal vitamin C is well tolerated.
- Highly stable vitamin C and protected from degradation.
- Supported by studies and advanced manufacturing processes.

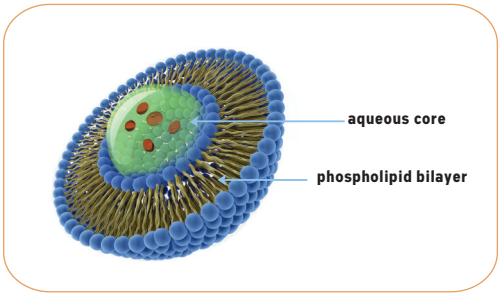
LIPOSOMES & LIPOSOMAL DELIVERY

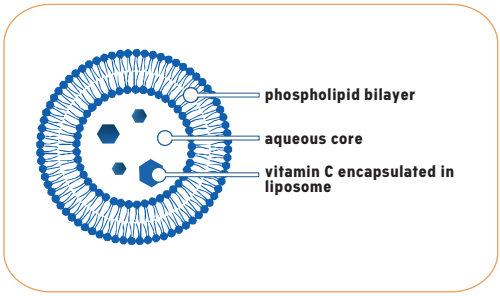
Liposomes are a form of lipid-based delivery that promote intestinal absorption, intracellular uptake and bioavailability of active nutrients, such as vitamin C. Liposomes are microscopic-sized spherical envelopes or pockets containing an aqueous core. The phospholipids are arranged into a spherical cell membrane like lipid bilayer, knows as a phospholipid bilayer.

Liposomes structures can be used for advanced delivery of vitamin C, which is then described as liposomal vitamin C. The liposomal vitamin C is created through a careful manufacturing process resulting in an innovative delivery form of the nutrient with significant advantages for the consumer.

In the case of water-soluble nutrients (hydrophilic), such as vitamin C, the active nutrient is entrapped inside the aqueous core of the liposome.

Illustrations of liposomal vitamin C structure





ADVANTAGES OF LIPOSOMAL DELIVERY OF VITAMIN C

The advantages of liposomal nutrients are derived from the liposome structure itself. Vitamin C is contained within the aqueous core and is sealed and encapsulated. Liposomal encapsulation provides a barrier around the active vitamin C, increasing resistance to digestive enzymes, acidity, intestinal flora, and oxidation.[1] This results in the protection of the vitamin C from degradation and oxidation as well as protecting the digestive tract from potential irritation, thereby improving delivery and bioavailability. In addition, interactions between the liposome's phospholipid bilayer membrane and the body's cell membranes offer enhanced cellular uptake through endosomal mechanisms.

As a result, the advantages of liposomal nutrients include:

- High bioavailability and absorption of vitamin C compared with conventional oral forms of vitamin C.
- Protection of vitamin C against the acid environment of the stomach, oxidation, and degradation.
- Increased transmucosal (oral) uptake and absorption of vitamin C.
- Increased intracellular delivery of vitamin C.
- High stability of vitamin C.
- Cost effective by being able to take a lower dose of vitamin C for the same effect.

STUDIES OF LIPOSOMAL DELIVERY OF VITAMIN C

A study of vitamin C circulating blood plasma concentrations comparing oral administration of liposomal vitamin C versus conventional vitamin C over four hours showed a +50% increase in absorption and bioavailability of liposomal vitamin C.[2]

Additional research has confirmed the magnitude of the advantages of liposomal vitamin C for bioavailability, including one study finding liposomal vitamin C was 1.77 times more bioavailable and another study showing liposomal vitamin C was 2.90-3.29 times more bioavailable than conventional vitamin C.[3,4]

LIPOSOMAL MANUFACTURING PROCESS

The Liposomal nutrients used by Quest are supplied by Lipsovit® and manufactured using a carefully controlled manufacturing process and the liposome structures are additionally verified using cryogenic transmission and scanning electron microscopy. Particle size plays a vital role in nanoparticle adhesion to and interaction with biological cells in the body.[5,6] At Quest we use Liposomal nutrients within a particle size of 200-400 nanometres (nm), ensuring they are a highly effective delivery system. The size of the liposomes and their particle size distribution are determined using a LUMiSizer® 651 particle size analyzer.

Image of Lipsovit® liposome structures using cryogenic transmission electron microscopy.

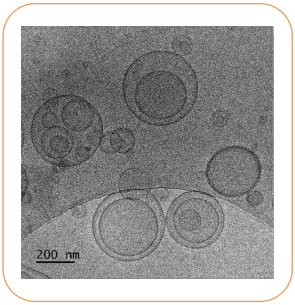


Image of Lipsovit® liposome structures using x1000 magnification under scanning electron microscope.

BENEFITS OF VITAMIN C SUPPLEMENTATION

Overview

Vitamin C is needed for the immune system to function effectively. It is required for the activation of Natural Killer cells, and without it their function is impaired. Vitamin C also contributes towards antioxidant protection due to its action as a free radical scavenger. Vitamin C is required for the adrenal glands to function optimally, and quickly becomes used up in periods of stress, decreasing immune system capacity and increasing the incidences of infections. Low levels of vitamin C are associated with increased risk of cardiovascular disease due to its antioxidant properties, and its necessity for collagen which maintains elasticity in the blood vessel wall. Vitamin C contributes to collagen production and is needed for the main structural tissues in the body such as skin, gums, bones, teeth and cartilage found in joints. Vitamin C helps with the absorption of iron, needed for haemoglobin and oxygen transportation around the body.

Stress

Vitamin C is needed in times of stress. Some vitamin C is stored in the adrenal glands and is released as part of the stress response.[7] In times of chronic stress, these stores may quickly become depleted, and need to be replaced. Cortisol is the primary stress hormone. In one placebo controlled trial subjects who took vitamin C had quicker cortisol recovery compared to the placebo group.[8] Vitamin C should be considered essential in the management of stress.

Immunity, detox & cell protection

Vitamin C is required for the proper function of Natural Killer T and B cells. One study showed that vitamin C was able to increase Natural Killer T and B cell function by 10 fold in patients who had their immune cells suppressed by toxins. Vitamin C completely restored immune function.[9] Immune cells accumulate vitamin C, with phagocytes storing the most vitamin C. Vitamin C is also a powerful antioxidant that protects the DNA of immune cells.

Another mode of action of vitamin C is its electron donation and powerful antioxidant status.[10] It is essential for the immune system that our oxidants are kept in check to prevent an excessive amount of reactive oxygen species (ROS) from damaging the immune cells.[11] One study reported that vitamin C enhances glutathione recovery after an oxidative challenge[12] , protecting the body from oxidative damage even further.

Cardiovascular health

Vitamin C works in multiple ways to help protect cardiovascular health. Its powerful antioxidant action helps to prevent the oxidation of cholesterol and moderately lowers cholesterol, helping to prevent and slow the progression of atherosclerosis and improving endothelial function.[14,10,11,12]

Vitamin C is required for the maintenance of collagen, a large structural part of the blood vessel walls. Collagen is required to maintain the flexibility of blood vessels which is essential for normal blood pressure. Some short-term trials have concluded that vitamin C supplementation reduced both systolic and diastolic blood pressure.[13,15]

Bones, teeth, skin, gums

Vitamin C is required to hydroxylate proline and lysine which creates procollagen. Procollagen is converted into collagen by 3 enzymes. Collagen is the main structural component in the body. Collagen is particularly important for the health of the bones, teeth, skin, gums and blood vessels.

Vitamin C helps to maintain structure and flexibility in bones and teeth. Collagen holds the minerals in place creating strength and resistance to breaking. Collagen creates elasticity in the skin and protects against wrinkling and sagging. Decreased intakes of vitamin C lead to premature wrinkling.

HEALTH NEEDS

HEART & CIRCULATION

IMMUNITY

STRESS & HECTIC LIFESTYLE

DETOX & CELL PROTECTION

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